

Linguistic Evidence for the Failure Mindset as a Predictor of Life Span Longevity

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Abstract

Background When people think that their efforts will fail to achieve positive outcomes, they sometimes give up their efforts after control, which can have negative health consequences.

Purpose Problematic orientations of this type, such as pessimism, helplessness, or fatalism, seem likely to be associated with a cognitive mindset marked by higher levels of accessibility for failure words or concepts. Thus, the purpose of the present research was to determine whether there are individual differences in the frequency with which people think about failure, which in turn are likely to impact health across large spans of time.

Methods Following self-regulatory theories of health and the learned helplessness tradition, two archival studies (total $n = 197$) scored texts (books or speeches) for their use of failure words, a category within the Harvard IV dictionary of the General Inquirer.

Results People who used failure words more frequently exhibited shorter subsequent life spans, and this relationship remained significant when controlling for birth year. Furthermore, study 2 implicated behavioral factors. For example, the failure/longevity relationship was numerically stronger among people whose causes of death appeared to be preventable rather than non-preventable.

Conclusions These results significantly extend our knowledge of the personality/longevity relationship while highlighting the value of individual differences in word usage as predictors of health and mortality.

Keywords Word usage · Accessibility · Failure · Health · Longevity · Learned helplessness

A perceived sense of control appears critical to self-regulation [1]. When people think that they can influence what happens to them, they engage in efforts to produce beneficial outcomes [2]. When people doubt their capacities to enact favorable changes, they are less likely to engage in active coping and they are prone to inertia [3]. Repeated failures after control can produce learned helplessness, whereby the organism appears to give up trying to avert negative outcomes [4] or master new skills [5].

Such perceptions of control, as well as outcome expectancies more generally, are thought to play an important role in health outcomes [6, 7]. People are perseverant in creating healthy new habits like exercise when they believe that they can be successful in creating them [8]. And, people are more persistent in overriding unhealthy habits like smoking when they believe that such changes are possible [7]. By contrast, pessimistic expectancies tend to undermine self-regulation efforts in the health domain [9].

Over the long haul, repeated efforts to create a healthy lifestyle can make a difference. Along these lines, Mokdad, Marks, Stroup, and Gerberding [10] estimate that 50% of deaths each year can be attributed to behavioral causes. Theoretically, then, people who more consistently strive to be healthy may be capable of prolonging their lives [6]. Conversely, and of more direct pertinence to the present predictions, a pessimistic orientation to the environment might be

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expected to shorten one's life span, in part due to poor health habits [11, 12].

Research on the personality/longevity relationship, however, is complicated by a number of factors. There are relatively few longitudinal datasets in which personality factors were assessed at one time and mortality outcomes were assessed at a much later date [13]. In addition, personality measures tend to assess relatively global aspects of the person [14] and more targeted measures often have greater health significance [15]. Such considerations suggest the potential utility of complementing trait-based research on longevity with a textual approach, one capable of aligning people along psychological dimensions on the basis of the words they use [16]. Using this approach, one can code archival texts for new dimensions of meaning [17] in the prediction of later death dates.

Relevant studies have shown that the use of first-person singular words can foreshadow suicide [18] and the use of words suggestive of greater social integration can predict longer life spans [19]. In the present research, we pursue a different direction, albeit one aligned with self-regulatory models of health [6, 7]. A variety of problematic orientations—including pessimism [20], helplessness [21], and fatalism [22]—seem likely to have a similar cognitive signature that we term the *failure mindset*. A mindset is a way of thinking [23], and a failure mindset is a way of thinking that emphasizes failure words or concepts [24].

Following the implicit motivation [25] and language use [16] literatures, we should be able to assess variability in the failure mindset in terms of the frequency with which the person uses failure words when writing or speaking [26]. Following the social cognition and judgment literature [27], people who use more failure words could be considered chronically accessible for failure concepts and such levels of accessibility should matter in their lives [28]. Along these lines, research suggests that accessible concepts bias perception, interpretation, and expectancies in an assimilation-related direction [27, 29]. Thus, the person with the failure mindset should, theoretically, notice failure and expect failure to more frequently accompany their goal-directed efforts [24]. This should tend to discourage them from making healthy changes, potentially shortening their lives [6, 20].

These ideas align with several bodies of work. People often decide whether to engage in an action by simulating whether the action would result in success or failure [30]. When they simulate failure as the likely outcome, they are much less likely to engage in the action, and a type of helplessness can ensue [12, 21]. Problematic health habits (e.g., drinking too much alcohol) can remain, and it will also be difficult to develop healthy new habits [31], which can lengthen or shorten one's life span over the long term [32]. The simulations of people with a failure mindset should more often result in failure as an expected outcome, in turn undermining goal-directed

efforts [9, 24]. As greater passivity in the health domain can cause or prolong health difficulties [15, 33], it is reasonable to think that the failure mindset could be health problematic as well.

We conducted two archival studies to test these ideas. In the first, we collected public-domain books from the Project Gutenberg website. We then correlated the percentage of failure words in these books with author life spans. We hypothesized an inverse relationship, such that authors using a greater frequency of failure words would subsequently live for a shorter period of time, as determined from author biographies. In the second study, we collected speeches from the American Rhetoric website. This allowed us to replicate the first study with a different source of materials. Also, because the speakers were relatively prominent, we could make rough inferences about health behaviors on the basis of biographical information. We expected to find some evidence implicating poorer health behaviors among failure-oriented individuals.

Study 1: Gutenberg Authors

Philip Stone and colleagues are widely credited as the originators of the quantitative approach to text analysis [34]. In addition, they developed their dictionaries for many years, culminating in the Harvard IV Psychosocial Dictionary [35]. We were able to modify their failure dictionary for use in the present studies (see “Method” section). We did not expect failure words to be exceedingly common, in part given the precisely targeted nature of the category [26]. We therefore sought book-length texts, which were obtained using the Project Gutenberg website. We hypothesized that authors using a higher percentage of failure words would subsequently die at a younger age.

Method

Authors

Study 1 texts were obtained from Project Gutenberg, which maintains a large, Internet-based (<https://www.gutenberg.org/>) library of digital books. These are books in the public domain, whose authors are often deceased. We sought a representative sample of these texts so that the study 1 findings would likely generalize to the Gutenberg library as a whole. This aim was accomplished by placing all of the (many thousand) titles into an Excel file, creating a randomized order of the titles, and then choosing entries from the top of the list.

Books were downloaded if they were written in English, and the following was true of the author: he or she was a native English speaker who was deceased and who was well known enough that exact dates of birth and death were available at

Encyclopedia Britannica.com. Sampling continued until we had downloaded 100 books by 100 authors (M word count = 79,989), which gave us adequate power (.80) to detect correlations in the 0.25 range. The books spanned multiple genres including poetry, theology, and philosophy but could be broadly classified as either fiction ($n = 57$) or non-fiction ($n = 43$), and authors included Emily Dickinson, F. Scott Fitzgerald, and William Shakespeare. Eighty six of the authors were male, 95 of them were from the USA ($n = 41$) or the UK ($n = 54$), and the average year of birth was 1825 ($SD = 69$ years).

Text Quantification

Philip Stone and his Harvard colleagues developed the General Inquirer as a comprehensive content analysis system for the social sciences [35, 36]. The first version of the General Inquirer was completed in 1961, but the dictionaries were soon expanded to cover a number of psychological and sociological constructs [36]. The final major revision of the dictionaries occurred in the 1970s and early 1980s and produced the Harvard IV system [26, 37]. By this point, the dictionaries performed very well, such that further substantive improvements were deemed unnecessary [26].

What is particularly appealing about the Harvard IV system is that considerable effort went into the development of dictionaries for affect, motivation, and emotion [26, 38]. Included among the seven motivation (“motivation-related words”) categories is the *failure* dictionary that we targeted in the present research, with words suggesting that someone has tried and failed to achieve their goals [26]. This dictionary as a whole includes 137 words (see www.wjh.harvard.edu/~inquirer/homecat.htm for a complete list). However, 23 of these focus on non-dominant word meanings that can only be identified through the use of complicated disambiguation routines [37]. Because such routines are now disfavored [17], we deleted these ambiguous words while retaining the 114 words whose meaning is more clearly failure-related (e.g., “blunder,” “fail,” “helpless,” “incompetent,” “ineffective,” “mishandle,” and “unsuccessful”; again, see www.wjh.harvard.edu/~inquirer/homecat.htm for a complete list of words).

The failure dictionary, like all General Inquirer dictionaries, was carefully developed on the basis of theory, word menu resources, expert ratings, and empirical evidence [36]. There is also good evidence for the reliability and validity of the Harvard IV system as a whole [24, 38, 39]. Nonetheless, it seemed useful to provide further evidence for the idea that the failure dictionary maps onto failure concepts. Accordingly, we asked five naïve judges to rate each of the 114 words in terms of whether it indicated failure [1], success [7], or neither [4] along a 7-point scale. Their ratings tended to converge ($\alpha = 0.73$), and we therefore averaged across judges. The average word rating differed from 4, the mid-point of the

scale, as revealed by a one-sample t test in which the expected value was set to 4, $t(112) = -27.32$, $p < 0.001$. Further, the average rating was near the failure side of the continuum ($M = 2.26$; $SD = 0.68$; 95% CI = 2.14 to 2.39). These ratings confirm the failure-related nature of the dictionary.

Stone and colleagues did not create a PC-based version of the General Inquirer. We therefore imported the Harvard IV failure dictionary into the Linguistic Inquiry and Word Count (LIWC) program, which allows the user to add additional dictionaries [40]. The LIWC program is widely used, and its computation procedures are purposely simple or transparent; in that, the program simply computes the percentage of words in a given text that match those in a pre-specified dictionary [17]. In the present case, the LIWC program told us how frequently a given Gutenberg author used failure-related words while writing. As might be expected, failure words were not used that often ($M = 0.4157\%$), but their percentage did vary markedly across authors ($SD = 0.1346\%$). The distribution was normal rather than skewed ($skew = 0.14$).

Results and Discussion

Life span was operationalized in terms of the number of days that the author lived, but longevity figures will be converted to years for comprehension ease. The average life span was 72.07 years ($SD = 15.88$). Of more importance, a simple regression revealed that authors using a higher (relative to lower) percentage of failure words lived for a shorter period of time, $t = -2.41$, $p = 0.018$, $beta = -0.236$. To gain a further appreciation of this relationship, we computed estimated longevity means at prototypically low (-1 SD) versus high ($+1$ SD) levels of the linguistic failure continuum [41]. These estimated means, which are shown in the top panel of Fig. 1, differ by 7.51 years, a fairly pronounced difference [13].

As a further check on the reliability of the study 1 findings, we sought to control for birth year, which will tend to predict life span due to medical advances [42]. Failure percentages continued to predict life span longevity when controlling for birth year, $t = -2.61$, $p = 0.010$, $beta = -0.251$, and they also continued to predict longevity when controlling for author sex (male = -1 ; female = $+1$), $t = -2.75$, $p = 0.007$, $beta = -0.279$. In another multiple regression, there was no failure percentage by genre (non-fiction = -1 ; fiction = $+1$) interaction, $t = -0.91$, $p = 0.365$, $beta = -0.093$, meaning that the failure/longevity relationship was general across this literary distinction. Thus, study 1 provides initial support for the idea that the psychological mindset that generates failure words is problematic for long-term health.

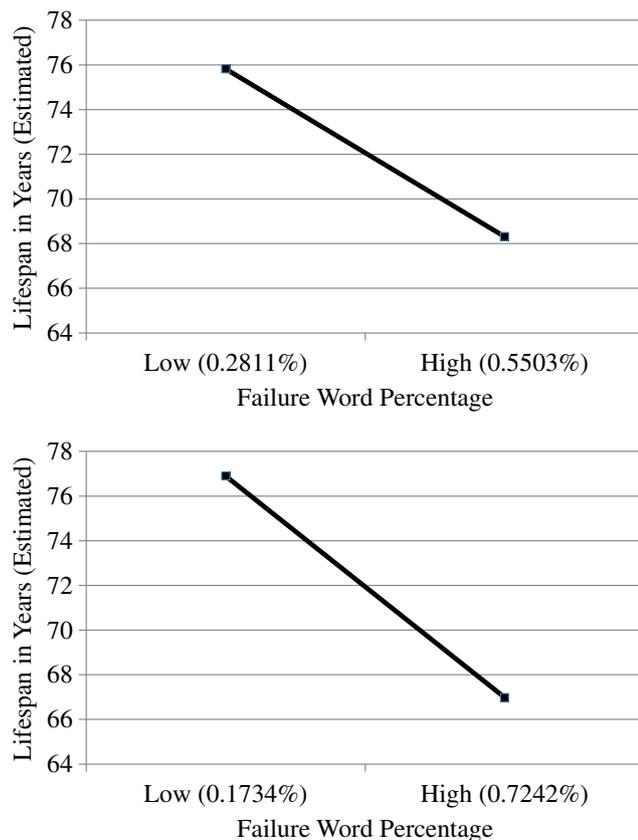


Fig. 1 Percentage of failure words as a predictor of life span longevity (estimated means), studies 1 (*top panel*) and 2 (*bottom panel*)

Study 2: Prominent Americans

Different types of communications can result in different word use patterns [34]. Thus, it seemed useful to try to replicate study 1 using speeches rather than books as the unit of analysis. Relative to books, speeches typically contain a more prominent role for the self [43]. Because self-related processes are also implicated in the health domain [6], there is some possibility that the failure/longevity relationship may be slightly stronger in study 2 (which sampled speeches) than in study 1 (which did not).

Although the authors of study 1 were sufficiently famous that dates of birth and death were known, they were not sufficiently famous to glean further biographical information, at least among the group as a whole. In study 2, we therefore targeted somewhat more famous people, which we could do using an American rhetoric website. For these Americans, we gathered basic biographical facts such as the number of marriages and divorces. For these people, also, we noted whether poor health habits (such as drinking too much) were apparent in their biographies and distinguished causes of death as preventable (e.g., cirrhosis of the liver) or not. These were somewhat necessarily rough-pass judgments, but we hoped to provide some evidence linking the failure mindset to behavioral patterns that are health relevant.

Method

Speakers

Study 2 sought to focus on prominent Americans. This was accomplished by sampling texts from American Rhetoric (<http://www.americanrhetoric.com>), which archives the public speeches of prominent Americans on the basis of their historical and cultural significance. The speakers had become eminent in fields such as politics, civil rights, sports, or entertainment, and the speeches themselves were all deemed to be culturally important.

As in study 1, we sought a representative sample of speakers and speeches. Accordingly, we created an Excel-based list of all of the speakers, randomized the order, and sought speeches from the first 100 of these public figures (giving us a power estimate of 0.80 to detect correlations in the 0.25 range), provided that they were deceased. If there was more than one speech for a particular target, we chose one at random (M word count = 3105). Life outcome data was missing for 3 people, resulting in a sample size of 97. The public figures included Susan B. Anthony, Benjamin Franklin, and Babe Ruth. Eighty two of these people were male, and the average year of birth was 1872 ($SD = 58$ years).

Text Quantification

To quantify the percentage of failure words in the study 2 texts, we used the same Harvard IV [26, 38] dictionary used in study 1, minus the 23 words that are ambiguous enough to require disambiguation routines [37]. The remaining 114 words (e.g., fail, helpless, and ineffective) were imported into the LIWC software program [40], which outputted failure category percentages ($M = 0.4488\%$; $SD = 0.2754\%$) for each of the 97 speakers. The distribution of failure scores was normal rather than skewed ($skew = 0.72$).

Biographical Information

The speakers of study 2 were more famous, on average, than the writers of study 1. This allowed us to collect a modest amount of life and death information by scanning Wikipedia biography pages, a reliable [44–46] and speaker-constant source of information. The average speaker had 1.20 marriages, 0.29 divorces, and 2.88 children, but none of these variables correlated with failure word percentages, $r_s < 0.05$, $p_s > 0.70$. Of more pertinence, we scanned the entries for any evidence of poor health habits, which included smoking, excessive alcohol consumption, poor diet, and non-compliance with medical advice. In addition, we thought that it is possible that the failure/longevity relationship would be stronger in the context of preventable, relative to non-preventable, causes of death. To examine this possibility, we coded deaths as

preventable or not, with preventability defined in terms of deaths that likely occurred too soon because the person did not alter their behaviors in the presence of health problems. Results involving poor health habits and preventability will be presented below.

Results

The average life span in study 2 was 71.94 years ($SD = 14.41$). People who used more failure words in their speeches, however, had shorter life spans than those who did not, as revealed in a simple regression, $t = -3.56$, $p = 0.001$, $\beta = -0.343$. This inverse relationship remained significant when controlling for birth year in one multiple regression, $t = -3.59$, $p < 0.001$, $\beta = -0.349$, and it remained significant when controlling for speaker sex (male = -1 ; female = $+1$) in a second multiple regression, $t = -3.32$, $p = 0.001$, $\beta = -0.320$. As a further check on the magnitude of the relationship, we computed estimated means at prototypically low (-1 SD) versus high ($+1$ SD) levels of the linguistic failure distribution [41]. As shown in the bottom panel of Fig. 1, there was a 9.92-year difference in life span longevity between these two estimated means, a difference comparable to study 1.

The failure mindset may discourage change, even when change would be beneficial. Along these lines, failure-oriented people may get stuck with poor health habits that they do not feel capable of rectifying. To examine this idea, we turned to the health habit measure of study 2, which was based on biographical judgments. Of the 97 historical figures, 28 of them had at least some evidence for poor health habits. A logistic regression revealed that linguistic failure was a significant predictor of such designations (0 = no evidence of poor health habits; 1 = evidence for poor health habits), $\chi^2 = 4.551$, $p = 0.033$, odds ratio = 1.619. Thus, results involving this admittedly broad measure provide some support for the idea that failure-oriented people have poorer health habits, which may contribute to their health problems.

As another way of examining similar ideas, we turned to results involving preventability. If the failure mindset hastens death via behavioral routes (e.g., poorer health habits), then we might expect the failure/longevity relationship to be stronger when deaths seem preventable rather than not. Consistent with these ideas, the failure/longevity relationship was stronger in magnitude among the 19 people judged to have died from preventable causes ($r = -0.560$, $p = 0.013$) than among the 78 people judged to have died from non-preventable causes ($r = -0.282$, $p = 0.013$). This pattern of results is consistent with a behavioral perspective of the failure mindset and its health-related significance.

The Harvard IV failure dictionary is unique in that it directly targets the theme of failures in goal striving [26, 37]. Accordingly, it did not seem likely to us that results involving

this dictionary would be isomorphic with results involving another, more general dictionary. To speak to questions of this type, though, we turned to some LIWC categories that have been implicated in research on the health benefits of expressive writing [47, 48]. Specifically, we computed LIWC scores for positive emotion (e.g., “happy”), negative emotion (e.g., “hate”), social processes (e.g., “friends”), and cognitive mechanisms (e.g., “know”). Failure percentages were not correlated with these other percentages, $|rs| < 0.20$, $ps > 0.05$. Furthermore, failure percentages continued to predict life span longevity even after controlling for the positive emotion, negative emotion, social process, and cognitive mechanism LIWC categories, $t = -3.48$, $p < 0.001$, $\beta = -0.354$. These results attest to the unique nature of the failure/longevity relationship.

Discussion

Study 2 replicated study 1 in showing that people who used more failure words lived for a shorter period of time. We had anticipated that the relationship might be slightly stronger when sampling speeches ($\beta = -0.343$) relative to books ($\beta = -0.236$) and the magnitudes did appear to differ in this manner. However, a comparative analysis revealed that the difference between the two magnitudes was not significant, $p > 0.20$. Even so, we encourage additional research to explore the possibility that the use of failure words is particularly problematic when people are talking about themselves and their lives, relative to some other topic.

In addition to replicating study 1, we were able to extend the first study. Failure-oriented people, we proposed, will tend to be less capable of motivating themselves to overcome poor health habits [7]. Consistent with this framework, we found that failure-oriented individuals were more likely to evidence poor health habits in their Wikipedia biographies. Although these assessments were necessarily somewhat global, they do provide valuable clues concerning the mechanisms (health behaviors, in particular) that are likely involved in the failure/longevity relationship.

As a further way of validating these ideas, we coded causes of death as preventable or not. Behavioral factors should matter more in the former case relative to the latter [10]. It was thus informative that the failure/longevity relationship was numerically stronger among people judged to have died for preventable reasons. Indeed, the relationship was quite strong among these people ($r = -0.560$). Altogether, these additional findings provide initial insights into some of the reasons why the failure mindset is problematic to longevity.

Relatedly, study 2 showed that the use of failure words was somewhat independent of the use of positive or negative emotion words, social words, or words reflective of cognitive operations. Thus, the failure mindset seems distinct from other

potential risk factors like depression or lack of social support, at least as manifest in word counts.

General Discussion

People who expect failure, relative to those who do not, will tend to be less effective in managing their lives [6]. Ultimately, the passivity and inertia associated with the failure mindset may even shorten life spans [12]. We were able to provide novel support for these ideas in two studies. Individual differences in the failure mindset were assessed by quantifying the percentage of failure words used by people in their books or speeches, as word usage tends to track habitual ways of thinking [16]. People using more failure words had shorter life spans, whether controlling for birth year or not, and they tended to die for preventable reasons. These results significantly extend our knowledge of the dispositional factors that matter for life span longevity, as discussed below.

Personality factors are typically assessed by self-report, but this method has some limitations [25, 49]. In the health and longevity domain, we wish to emphasize at least three. There are relatively few datasets in which self-reports of personality were obtained at one time and death dates were obtained at a much later time [13]. A benefit of the present text-based approach is that we did not require self-reports of personality. Rather, we could align people along a failure-oriented dimension solely on the basis of the words that they used. This archival approach can significantly extend the possibilities for retrospective-prospective designs of health and disease [50].

Second, self-reported personality traits can be heterogeneous in content and uncertain with respect to mechanism [14, 51]. For example, neuroticism can be linked to negative affect of all forms (including anger, anxiety, and depression), self-consciousness, low self-esteem, stress reactivity, and tendencies toward avoidance [52]. Only some of these aspects of neuroticism may be health relevant [32]. By contrast, content analysis focuses on particular categories of meaning, and it can target the particular categories that are most likely to be health relevant [50]. The failure category [26], with its theoretical links to passivity and helplessness [4], should be particularly relevant to health from a self-regulatory perspective [7], and we were able to provide evidence in favor of this idea.

Third, there are theoretical considerations in favor of our cognitive approach. The failure mindset should not be equated with existing personality traits or measures but may capture a cognitive signature that is common to several of them. Specifically, variables like negative affectivity, pessimism, and fatalism may possess health-related significance in part because they are associated with something like the failure mindset [15]. Our procedures allowed us to isolate this failure mindset, thus permitting further advances in understanding

cognitive pathways toward health or illness [53]. Along these lines, it is notable that many of the key variables in self-regulation—such as goals, expectancies, and perceived progress—are somewhat centrally cognitive constructs [54]. The present procedures show how elements of such a system can be operationalized in terms of the words that people naturally use when speaking or writing [25].

Indeed, one purpose of our work was to reclaim the carefully created content analysis dictionaries of Stone and colleagues [26, 36]. The dictionaries were revised at least four times over the period of 20 years and seek to be somewhat comprehensive in their coverage of psychological and sociological themes [35]. Their coverage of motivational and affective states is especially noteworthy [55], but the dictionaries were embedded into a platform (the General Inquirer), with an extensive set of processing algorithms [37], that has fallen out of use [34]. By importing the dictionaries into the LIWC [40], one can take advantage of these classic dictionaries [55] in modern content analysis research.

In terms of health implications, our findings offer new support for theories that implicate self-regulatory processes [6, 7]. People with accessible failure concepts seem to be less proactive in caring for their bodies, and such dynamics are associated with shorter life spans. Further, there was some support for a health behavior perspective of this relationship, specifically in study 2. For example, the biographies of people who used more failure words were more likely to highlight poor health habits such as smoking, fatty diets, or excessive alcohol consumption. Nonetheless, it must be acknowledged that these links would benefit from further study, presumably among living populations. People who use more frequent failure words, our analysis suggests, should tend to exhibit poorer health habits, likely in a number of domains [53]. Furthermore, they should exhibit greater inertia in their health behaviors and lesser persistence when attempting to change them [7]. And, their health problems are likely to be more severe, as can be assessed through health center visits or hospital records [50]. Process-oriented research along these lines would complement the life span longevity focus of the present investigation.

We have linked the failure mindset, theoretically, to factors such as pessimism and helplessness. Nonetheless, it is worth pointing out that word usage measures tend to correlate modestly with self-reports of personality or self-belief [16]. From this perspective, the failure mindset can be considered an implicit, rather than explicit, measure of dispositional tendencies [56]. A related point is that our results are unlikely to be due to covarying levels of depression in that the use of failure words did not correlate with the use of negative emotion words, a category designed to assess such experiences [40]. Also, our assessment approach can be distinguished from attributional measures of pessimism [12] because it does not focus on the attributions that people make concerning negative events.

Altogether, then, the Harvard IV failure dictionary can be considered a new way of assessing a cognitive form of pessimistic thinking.

We focused on relatively famous people because this allowed us to locate texts (books or speeches) as well as discern dates of birth and death from public records. The failure/longevity relationship should not be particular to famous people, though. In fact, it could be stronger among samples that include a greater proportion of unsuccessful people, for whom a failure mindset could be more debilitating [57]. The samples were predominantly, though not exclusively, male. Thus, it would be valuable to extend the present results to other datasets that include a greater proportion of females. The behavioral processes that we have implicated, though, would likely function similarly among males and females [58].

In conclusion, self-regulatory models of health (e.g., 4) led us to focus on the failure mindset as a possible predictor of longevity. Individual differences in this mindset were quantified in terms of the percentage of failure words [26] present in texts or speeches. As hypothesized, people using more failure words had shorter life spans than people using such words less frequently. These results encourage further research on the failure mindset as a predictor of health-related behaviors and outcomes.

Compliance with Ethical Standards

Authors' Statement of Conflict of Interest and Adherence to Ethical Standards Ian B. Penzel, Michelle R. Persich, Ryan L. Boyd, and Michael D. Robinson declare that they have no conflict of interest. All procedures, including the informed consent process, were conducted in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000.

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