TITLE: Predicting emotional health indicators from linguistic evidence of psychological distancing

SHORT TITLE: Predicting health from linguistic distancing
Abstract

Psychological distancing, a form of cognitive reappraisal, involves construal of emotionally-valenced stimuli in an objective manner, or with perceived spatial and temporal distance. Prior work suggests that in appropriate contexts, reappraisal broadly, and distancing specifically, is related to adaptive mental and physical health outcomes. Additionally, recent research suggests that shifting language to be more distant (i.e., linguistic distancing (LD)) can have adaptive emotion regulatory effects. The present study addressed whether LD is also associated with adaptive health indicators. Participants transcribed their thoughts while viewing negative or neutral stimuli in one of three ways: 1) by implementing objective language, 2) by implementing spatially and/or temporally far away language, 3) or by responding naturally. Across psychological distancing groups, LD was associated with lower negative affectivity (lower perceived stress and depression symptoms), better general well-being (better emotional well-being and energy and vitality), and better emotion regulation (ER) (greater reappraisal frequency and fewer difficulties in implementing ER). Participants who used more LD in the objective group had lower negative affectivity, better general well-being, and better ER, and those in the far group had better ER. The results reveal linguistic mechanisms underlying ER and its relationship to health indicators, suggesting future examination of LD interventions.

KEYWORDS: emotion regulation, reappraisal, linguistic, distancing, health
Introduction

When confronted with a very unpleasant, stressful situation, sometimes the most adaptive response is to take a step back and coolly appraise what is happening. Indeed, recent empirical research has shown how distancing oneself from a negative situation, including by appraising the situation as an objective, impartial observer, or as spatially or temporally far away, can be an adaptive way to regulate one’s emotions (Denny & Ochsner, 2014; Kross, Ayduk, & Mischel, 2005; Ochsner, Silvers, & Buhle, 2012; Trope & Liberman, 2010). More recently, linguistic evidence of psychological distancing obtained via analysis of expressive writing has been shown to be associated with greater emotion regulation efficacy (Nook, Schleider, & Somerville, 2017). While a growing body of evidence is beginning to coalesce around the beneficial effects of distancing in a variety of populations and contexts (Kross & Ayduk, 2017), the question of whether psychologically distanced language is associated with adaptive health indicators is less clear and represented the focus of the current work; such relationships, if observed, may elucidate dependencies among language, emotion, and health, and may probe the translational value of linguistic distancing as an emotion regulation intervention.

In general, cognitive change targeting appraisal of an emotional situation is a powerful, flexible mechanism for emotion regulation. Indeed, a growing body of work has examined the adaptive impacts of cognitive reappraisal, which involves changing one’s cognitive construal of an emotionally evocative stimulus to alter its emotional impact, on experience, behavior, and physiology (Gross, 1998b, 2015a), including neural activity (Buhle et al., 2014; Ochsner et al., 2012). A sub-form, or tactic (McRae, Ciesielski, & Gross, 2012) for implementing reappraisal is psychological distancing. According to construal level theory (Trope & Liberman, 2010), distancing can involve interpreting a negative situation as an objective, impartial observer (i.e., by
“taking a step back” and employing self-distancing; Kross & Ayduk, 2017), and/or by interpreting a negative situation as spatially or temporally far away (Trope & Liberman, 2010). In addition, there is evidence that increasing psychological distance in one domain (e.g., self/social) often leads to increases in distance in other domains as well (e.g., spatial, temporal; Kross & Ayduk, 2017; Liberman & Trope, 2008; Trope & Liberman, 2010), and individual studies have often operationalized distancing using instructions that manipulate appraisal in multiple distancing domains at once (e.g., Denny & Ochsner, 2014).

Recent research has demonstrated that shifting language to be more distant helps regulate negative emotions, as distance decreases negative affect and language can encode distance (Gross, 1998b; Kross & Ayduk, 2017; Trope & Liberman, 2010). In addition, psychological distancing has demonstrated decreases in physiological and neural indices of affective arousal, such as blood pressure and skin conductance (Ayduk & Kross, 2008; Gross, 1998a; Paret et al., 2011) and amygdala activity (Ochsner & Gross, 2008; Ochsner et al., 2012; Tamir & Mitchell, 2011).

**Linguistic Distancing and Emotion Regulation.** Recent work has begun to elucidate the linguistic mechanisms by which psychological distancing impacts emotion regulation (e.g., by speaking in the third person; Kross & Ayduk, 2017; Kross et al., 2014). In addition, Nook and colleagues (2017) examined whether distancing one’s language spontaneously regulated one’s emotions after writing about negative images using psychologically “close” or distant” language in social (i.e., self-related), spatial, and temporal domains. The authors used Pennebaker’s Linguistic Inquiry and Word Count (LIWC; Pennebaker et al., 2015) to analyze the text responses and computed a linguistic distancing metric that combined several distancing measures (i.e., first-person singular pronouns, present tense verbs, articles, discrepancy words, and words more than six letters). Nook and colleagues demonstrated that in all three distancing domains, using distanced language
reduced negative affect, and that the instructed use of distanced language in one domain (e.g.,
physical, social, or temporal) had carryover effects in modulating language use in the other
domains as well.

Further work has linked shifts in pronoun usage to reduced negative affect in distressing
situations. For example, participants who use non-first-person pronouns and one’s own name
instead of first-person pronouns while introspecting have been shown to report lower negative
affect (Mehl, Robbins, & Holleran, 2012; Nook et al., 2017; Pennebaker & King, 1999). Further,
Kross and colleagues also demonstrated that non-first-person language use was shown to lead
people to appraise future stressors as more challenging and less threatening (Kross et al., 2014).
However, this prior work has focused on usage of first-person pronouns in particular rather than a
comprehensive linguistic signature more directly reflective of psychological distancing (Cohn,
Mehl, & Pennebaker, 2004; Mehl, Robbins, & Holleran, 2012; Nook et al., 2017).

**Emotion Regulation and Health Indicators.** Extensive research has indicated that individuals who
are better at regulating their emotions have better physical and mental health outcomes (Aldao,
Nolen-Hoeksema, & Schweizer, 2010; Florin, Freudenberg, & Hollaender, 1985; Greer & Watson,
1985; Hu et al., 2014; Verzeletti, Zammuner, Galli, & Agnoli, 2016). For example, emotion
dysregulation has been associated with increased risk for cardiovascular disease (Appleton &
Kubzansky, 2014; Berna, Ott, & Nandrino, 2014).

In addition, emotion regulation ability has been shown to predict risk of anxiety, depression,
life satisfaction, and overall general health (Verzeletti et al., 2016). Successful emotion regulation
is associated with increased psychological well-being, including both emotional and social
functioning. For example, individuals who use reappraisal habitually show positive health
outcomes, including fewer depressive symptoms, greater self-esteem, and greater life satisfaction
(Gross & John, 2003). Further, reappraisal has also been shown to be associated with stronger social relationships (English, John, Srivastava, & Gross, 2012). In addition, for highly stressed individuals, cognitive reappraisal has been shown to exhibit protective effects, as individuals who habitually use more reappraisal exhibit less depressive symptoms than individuals who use reappraisal less (Troy, Wilhelm, Shallcross, & Mauss, 2010). Furthermore, individuals who frequently reappraise report lower levels of stress-related symptoms, compared to other emotion regulation strategies like suppression (Moore, Zoellner, & Mollenholt, 2008). However, this literature has not yet explored whether these beneficial health indicators can be predicted from analysis of expressive writing during emotion regulation alone, which if substantiated may provide for a relatively quick, unobtrusive means of predicting a variety of health-relevant information.

**Emotion Regulation and Expressive Writing.** Expressive writing of distressing situations has been shown to be cathartic and lead to sense-making, allowing individuals to gain broader, objective perspectives, and distance themselves from adverse situations. Recent work has demonstrated that expressive writing of distressing experiences promotes self-distancing (i.e., social distancing), as indexed by decreased use of first-person singular pronouns (Park, Ayduk, & Kross, 2016). Relatedly, affective labelling (i.e., putting feelings into words) has been shown to reduce self-reported negative affect (Lieberman, Inagaki, Tabibnia, & Crockett, 2011). Expressive writing demands a certain degree of structure and basic labelling or acknowledgement of emotions (Lieberman et al., 2007), which may underlie its adaptive emotional effects (Pennebaker & Chung, 2007).

Further, there is evidence of positive health outcomes being associated with expressive writing about negative situations (Lu & Stanton, 2010; Pennebaker, 1997). For example, expressive writing is associated with better long-term physical health indexed by illness-related
visits to the doctor, blood pressure, lung function, liver function, and number of days in the hospital (Baikie & Wilhelm, 2005). In addition, a rich feature of expressive writing is the translation of emotional experiences into words. Even in the absence of an instruction to regulate, extensive verbal processing reduces negative affect and enhances immune function, including T-helper cell growth, antibody response to Epstein-Barr virus, and antibody response to hepatitis B vaccinations (Pennebaker & Chung, 2007).

Overall, the goal of the present study was to further probe the relationship between linguistic distancing and emotion regulation. In particular, we aimed to examine whether linguistic evidence of psychological distancing (implemented via either one of two sub-tactics for distancing: objective, impartial appraisal or via manipulation of spatial and temporal distance) is associated with adaptive health-related indicators in addition to reduced self-reported negative affect. Addressing these relationships is important in order to further probe the psychological mechanisms underlying distancing as well as to examine the translational adaptive potential of linguistic distancing via expressive writing. Notably, we chose to include three groups (one group manipulated to use the objective tactic, the second group manipulated to use the spatial and/or temporal tactic, and the third group to respond naturally) given prior work that has linked spatial and temporal aspects of distancing (Nook et al., 2017; Parkinson, Liu, & Wheatley, 2014). We chose to use the standardized linguistic distancing metric to index the degree of language-based psychological distancing to maximize comparability across groups, given the common linguistic features underlying the distancing construct. We predicted that self-reported negative affect would be reduced in both distancing groups and that linguistic distancing would be associated with greater indicators of positive health outside the lab.

**Method**
Participants. Ninety-four healthy adults fluent in English provided written informed consent to participate in the study. Participants were recruited from Rice University’s undergraduate psychology participant pool and were compensated with academic credit. All 94 participants were included in the final analyses (67% female; 34% Asian or Pacific Islander, 34% Caucasian, 22% Hispanic or Latino, 10% African-American, 6% Mixed-Race; age $M = 19.37$ years, age $SD = 1.19$ years). As described below, participants were randomly assigned to one of three groups (Objective, Far, Look Only). The final sample included 32 participants in the Objective group (age $M = 19.25$ years, age $SD = 1.01$ years), 31 participants in the Far group (age $M = 19.30$ years, age $SD = 0.99$ years), and 31 participants in the Look Only group (age $M = 18.97$ years, age $SD = 0.87$ years). All procedures were approved by the Rice University Institutional Review Board.

Materials and Measures

Stimuli. Participants viewed neutral or negative digital color images selected from the International Affective Picture System (IAPS; Lang et al., 1993). Each participant viewed 40 negative pictures that were highly negative ($M = 2.15$, $SD = 1.38$, on a scale ranging from 1 to 9 where 9 is completely happy), and highly arousing ($M = 6.11$, $SD = 2.25$, on a scale ranging from 1 to 9 where 9 is completely aroused). Each participant also viewed 20 neutral images that are neither negative ($M = 6.06$, $SD = 1.46$) nor arousing ($M = 3.91$, $SD = 2.19$) from the IAPS database.

Procedure

Questionnaire Measures. Following informed consent, all participants first completed questionnaire measures assessing mental and physical health indicators including negative affectivity, general health and well-being, and emotion regulation. To assess negative affectivity, participants completed the Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977), which assesses depressive symptomology during the past week ($Cronbach’s \alpha = .85$), as
well as the Perceived Stress Scale (PSS; Cohen, Kamarck, & Mermelstein, 1983), which assesses the participant’s perceived stress over the course of the past few days (Cronbach’s $\alpha = .84$).

To assess general health and well-being, participants completed the RAND short-form health survey (SF-36; Ware & Sherbourne, 1992), which is a 36-item measure containing eight multi-item subscales: 1) physical functioning (Cronbach’s $\alpha = .93$), 2) role limitations due to physical health (Cronbach’s $\alpha = .84$), 3) role limitations due to emotional problems (Cronbach’s $\alpha = .83$), 4) energy/fatigue (Cronbach’s $\alpha = .86$), 5) pain (Cronbach’s $\alpha = .78$), 6) emotional well-being (Cronbach’s $\alpha = .90$), 7) social functioning (Cronbach’s $\alpha = .85$), and 8) general health (Cronbach’s $\alpha = .78$) (Murdock, Fagundes, Peek, Vohra, & Stowe, 2016; Ware & Sherbourne, 1992).

To assess emotion regulation, participants first completed the Emotion Regulation Questionnaire (ERQ; Gross & John, 2003), which assesses how frequently participants report regulating their emotions via reappraisal and expressive suppression (Cronbach’s $\alpha = .79$), as well as the Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004), a widely-used assessment of emotion dysregulation (Cronbach’s $\alpha = .93$). Please see Supplemental Materials for additional details.

**Task Training.** Participants were then randomly assigned to one of three groups: 1) Objective, 2) Far or 3) Look Only. Each group was provided different instructions on how to describe the stimuli depending on the sub-tactic. In the Objective group, participants were instructed to view the images as an objective, impartial observer and use language that reflected that appraisal. Specifically, they were told “when you see the instruction “change,” we would like you to write about that picture using impartial and objective words.” For example, a sample interpretation of an example negative stimulus provided was “A wounded person is lying on the ground with blood
clearly visible.” In the Far group, participants were instructed to use spatially and/or temporally distant language to describe the images that they saw. Specifically, they were told “when you see the instruction “change,” we would like you to write about that picture using words that make the image seem physically and temporally far away from you.” For example, a sample interpretation of an example negative stimulus provided was “A wounded person was lying on the ground a long time ago and far away from me.” Participants in the Look Only group saw all of the same images and were instructed to simply look and respond naturally to all images and write about them accordingly. Participants then underwent the emotion regulation training procedure depending on the group to which they were randomly assigned. The training procedure lasted for 8-10 minutes and was conducted at a computer in the laboratory by a trained experimenter using procedures similar to those used in previous research (Denny & Ochsner, 2014).

In particular, participants were told that they would see a series of images preceded by one of two cues: either the word “LOOK” or the word “CHANGE”. When participants viewed the word "LOOK," they were instructed to look at the stimulus and respond as they naturally would. When the participants viewed the word “CHANGE,” they were instructed to use objective, impartial language (Objective group), or instructed to describe the image in terms of increased spatial or temporal distance (Far group), depending on the group to which they were assigned, during the upcoming expressive writing period. Thus, there were three trial types: Look Neutral (i.e., the LOOK cue paired with a neutral image), Look Negative (i.e., the LOOK cue paired with a negative image), and Change Negative (i.e., the CHANGE cue paired with a negative image).

After these instructions were given, four “walk-through” example images were then presented (1 example Look Negative trial followed by 3 example Change Negative trials in the Objective and Far groups; 4 Look Negative trials for the Look Only group), with self-paced timing and the
experimenter present. While the image was on the screen, participants were instructed to write
about their thoughts and feelings in response to the image while applying the cued instruction
(either “LOOK” or “CHANGE”), following procedures established by Nook and colleagues (Nook
et al., 2017). The experimenter ensured that the participant understood the task directions before
proceeding.

Reappraisal Task. Participants then completed the reappraisal task. The task session for all groups
consisted of 60 total trials. Each trial consisted of four phases. First, a fixation cross was presented
for 3 to 5 s ($M = 4$ s). Second, a cue (“LOOK” or “CHANGE”) was presented for 4 s. Then, either
a negative or neutral image was presented for 30 seconds. During this time, participants were
instructed to write about their thoughts and feelings in response to the image while applying the
cued instruction, per the training procedures above. The image advanced automatically after 30 s.
Finally, for each trial, participants were asked during a 4 s rating period to provide a self-reported
negative affect judgement (“How bad do you feel?”) on a scale of 1 (not bad at all) to 7 (extremely
bad).

The task consisted of 20 Look Neutral trials, 20 Look Negative trials, and 20 Change
Negative trials. In the Look Only group, there were 40 Look Negative and 20 Look Neutral trials.
Three task runs were presented (consisting of 20 trials per condition per run). Order of runs were
counterbalanced across participants. All stimuli were unique during both the training phase and in
the actual task, and negative images were counterbalanced in their assignments to condition (i.e.,
LOOK or CHANGE) across participants. At the conclusion of the study, participants were orally
debriefed and thanked for their participation.

Data Analysis. To quantify the degree of linguistic distancing employed by each participant on
each trial, we used Pennebaker's Linguistic Inquiry and Word Count (LIWC; Pennebaker et al.,
238 2015), which computes percentages of words falling within particular word categories. LIWC has
239 been used extensively in empirical research exploring similar constructs, ranging from
240 examinations of the adaptiveness of social feedback (Doré, Morris, Burr, Picard, & Ochsner,
241 2017), to emotion regulation strategies such as self-distancing (Kross & Ayduk, 2008). The LIWC
242 analyses focused on positive affect words, negative affect words, and a composite linguistic
243 measure of psychological distancing (i.e., using the methodology of Mehl et al., 2012; Nook et al.,
244 2017; Pennebaker & King, 1999). Please see Supplemental Materials for analyses on negative and
245 positive affect word usage. In particular, the composite psychological distancing score was
246 calculated by $z$-scoring first-person singular pronouns (e.g., I, my), present-tense verbs, articles
247 (e.g., the, a), discrepancy words (e.g., would, should), and words of more than six letters, which
248 were then averaged as indicated below. Previous research has indicated that these lexical
249 components best track verbal immediacy and have been used to index linguistic distancing in
250 previous literature (Mehl, Robbins, & Holleran, 2012; Cohn et al., 2004; Nook et al., 2017;
251 Pennebaker & King, 1999). Accordingly, the $z$-scored frequencies of first-person singular
252 pronouns, present-tense verbs, and discrepancy words were reverse-scored (multiplied by -1) and
253 then averaged with the $z$-scored frequencies of articles and words of more than six letters for each
254 trial, per participant and per group. Linguistic distancing was then calculated as the difference
255 between Change Negative and Look Negative using this metric (i.e., score for Change Negative –
256 score for Look Negative). Lower linguistic distancing scores suggest that writing is personal and
257 focused on the present, whereas higher linguistic distancing scores show that writing is impersonal
258 and not focused on the present.

259 We first aimed to conduct manipulation checks to examine whether self-reported negative
260 affect ratings and composite linguistic distancing scores differed between the Look Negative and
Change Negative trials in the Objective and Far groups. We used repeated-measures analyses of variance (ANOVAs) to test for significant differences among the three trial types (Change Negative, Look Negative, and Look Neutral) and among the groups. Post-hoc $t$-tests were conducted to further assess pair-wise differences between the trial types and groups. Then, we examined correlations between linguistic distancing and health indicators including symptoms of depression (CES-D), perceived stress (PSS), general well-being (all eight subscales of the SF-36), reappraisal frequency (a subscale of the ERQ), and difficulties in emotion regulation (DERS).

Three standardized health composite metrics were created: 1) Negative Affectivity, 2) General Well-Being, and 3) Emotion Regulation. For each scale, we first created $z$-scores for each participant, and then we averaged standardized scores across the following scales for each participant: 1) The Negative Affectivity composite score averaged the standardized Perceived Stress scores and Symptoms of Depression scores. 2) The General Well-Being composite score averaged the standardized Energy and Vitality scores, Emotional Well-Being scores, and Social Functioning scores. 3) The Emotion Regulation composite score averaged the standardized Reappraisal Frequency scores and standardized reverse-scored Difficulties in Emotion Regulation scores. Once the three new composite scores were created, we computed the correlations with the composite linguistic distancing metric.

**Results**

**Self-reported negative affect ratings.** As a manipulation check, we first assessed the self-reported negative affect data. There was a main effect of trial type on self-reported negative affect reports, $F(2, 156) = 585.03, p < .001$, Cohen’s $f = 2.70$, and a main effect of group on self-reported negative affect reports, $F(2, 98) = 3.25, p = .043$, Cohen’s $f = 0.25$ (Figure S1 and Table S1). As expected, across the psychological distancing groups, participants reported feeling less negative in the
Change Negative trials relative to the Look Negative trials, $t(62) = 3.57, p < .001$, Cohen’s $d = 0.44$. To unpack the main effect of group, we did post-hoc pairwise comparisons among the groups; however, no pairwise group differences were observed ($p > .3$). Overall, manipulation checks were successful. Please see Supplemental Materials for additional details.

**Composite Linguistic Distancing.** Table S1 shows descriptive statistics for each trial type for each group on all lexical component measures as well as composite linguistic distancing scores. There was a main effect of trial type on composite linguistic distancing scores, $F(2, 151) = 35.42, p < .001$, Cohen’s $f = 0.68$, and a main effect of group on composite linguistic distancing scores, $F(2, 94) = 8.54, p < .001$, Cohen’s $f = 0.43$ (Figure 1 and Table S1). As expected, across the psychological distancing groups (Objective and Far), participants implemented more linguistic distancing during Change Negative trials relative to Look Negative trials, $t(62) = 8.59, p < .001$, Cohen’s $d = 1.08$. To unpack the main effect of group, participants in the Objective group implemented more linguistic distancing overall relative to the Look Only group, $t(61) = 5.15, p < .001$, Cohen’s $d = 1.30$, and among Look Negative trials in particular ($t(61) = 3.25, p = .002$, Cohen’s $d = 0.82$). Participants in the Far group also implemented more linguistic distancing overall relative to the Look Only group, $t(60) = 4.62, p < .001$, Cohen’s $d = 1.17$, and among Look Negative trials in particular ($t(60) = 2.80, p = .007$, Cohen’s $d = 0.71$). However, there were no significant differences in composite linguistic distancing between the Objective and Far groups for any trial type (all $p > .9$). Further, composite linguistic distancing did not significantly predict reappraisal success (i.e. mean self-reported negative affect score for Change Negative relative to Look Negative trials; Table S2).

**Association between linguistic distancing and health indicators.**
Table S3 shows descriptive statistics by group for each health indicator. There were no pair-wise significant differences among the groups for any of the health indicator questionnaire measures. No outliers—quantified as more than three IQRs from the hinges—were present in any variable (i.e., composite linguistic distancing and all health indicator scores).

Before examining the association between linguistic distancing and health-relevant indicators, as a manipulation check, we assessed the degree of correlation of the health indicators with each other. Many, though not all, of the health indicators above were correlated with each other in expected directions (Table S4). We then examined associations between linguistic distancing and health indicators in three ways: collapsing across the Objective and Far groups in order to assess associations with distancing in general, and then within each group alone. Raw data pertaining to analyses performed in the present study are available at the following link: https://osf.io/8bmsp/?view_only=6574b8ca7c544a8eadc52d7d046fe4cd.

**Association between linguistic distancing and health indicators: Collapsing across the Objective and Far groups.**

**Negative Affectivity.** Collapsing across distancing groups (i.e., Objective and Far), participants with greater linguistic distancing in their transcriptions during reappraisal, indexed by subtracting the Look Negative linguistic distancing metric from the Change Negative linguistic distancing metric, reported diminished amounts of negative affectivity (Figure 2 and Table 1). Consistent with hypotheses, there was a significant negative association between linguistic distancing and the negative affectivity composite score, $r(61) = -.30, p = .017, 95\% \text{ CI} [-.511, -.057]$. There was a significant negative association between linguistic distancing and perceived stress as measured by the PSS ($M = 17.5, SD = 7.7$), $r(61) = -.31, p = .013, 95\% \text{ CI} [-.518, -.068]$ (Figure 2A), and
symptoms of depression as measured by the CES-D ($M = 15.0$, $SD = 11.3$), $r(61) = -.27$, $p = .035$, 95% CI $[-.482, -.019]$ (Figure 2B).

**General Well-Being.** In addition, individuals with greater linguistic distancing reported greater general well-being as measured by the SF-36. There was a significant positive association between linguistic distancing and the general well-being composite score, $r(61) = .28$, $p = .029$, 95% CI $[.030, .490]$. There was a significant positive association of linguistic distancing and emotional well-being ($M = 67.2$, $SD = 17.6$), $r(61) = .29$, $p = .021$, 95% CI $[.046, .502]$ (Figure 2C), and a marginal positive association of linguistic distancing and energy and vitality ($M = 49.2$, $SD = 15.5$), $r(61) = .23$, $p = .066$, 95% CI $[-.016, .454]$ (Figure S2).

**Emotion Regulation.** Finally, individuals with greater linguistic distancing reported better emotion regulation. There was a significant positive association between linguistic distancing and the emotion regulation composite score, $r(61) = .33$, $p = .009$, 95% CI $[.085, .531]$. There was a significant negative association of linguistic distancing and difficulties in emotion regulation (i.e., DERS scores) ($M = 76.9$, $SD = 19.4$), $r(61) = -.29$, $p = .022$, 95% CI $[-.500, -.043]$ (Figure 2D), and a positive association with reappraisal frequency (i.e., ERQ reappraisal scores) ($M = 30.6$, $SD = 5.9$), $r(61) = .27$, $p = .031$, 95% CI $[.026, .487]$ (Figure S2), respectively.

Results were broadly consistent when using a regressed change approach, which involved implementing general linear models with linguistic distancing during Change Negative trials as the independent variable, linguistic distancing during Look Negative trials as the covariate, and each health index as the dependent variable, although these analyses did not reach significance thresholds for negative affectivity and emotion regulation measures. Please see Supplemental Materials for more details.

**Association between linguistic distancing and health indicators: Objective Group.**
Negative Affectivity. We next assessed these relationships within each group in order to probe differences according to different distancing sub-tactics (Figure S3). Within the Objective group, participants with greater linguistic distancing reported overall greater mental health. There was a significant negative association between linguistic distancing and the negative affectivity composite score, \( r(30) = -.45, p = .010, 95\% \text{ CI} [-.690, -.120] \). Greater linguistic distancing within this group showed a significant negative association with symptoms of depression (i.e., CES-D scores) \((M = 14.1, SD = 12.8), r(30) = -.44, p = .011, 95\% \text{ CI} [-.111, -.685]\), and perceived stress (i.e., PSS scores) \((M = 16.7, SD = 8.5), r(30) = -.43, p = .015, 95\% \text{ CI} [-.675, -.092]\).

General Well-Being. Individuals with greater linguistic distancing reported greater general well-being (i.e., SF-36 scores). There was a significant positive association between linguistic distancing and the general well-being composite score, \( r(30) = .41, p = .018, 95\% \text{ CI} [.076, .667] \). There was a significant positive association with emotional well-being \((M = 66.8, SD = 19.7), r(30) = .41, p = .019, 95\% \text{ CI} [.073, .665]\), a significant positive association with social functioning \((M = 82.0, SD = 16.2), r(30) = .36, p = .046, 95\% \text{ CI} [.007, .626]\), and a significant positive association with energy and vitality \((M = 51.3, SD = 17.5), r(30) = .35, p = .048, 95\% \text{ CI} [.004, .624]\).

Emotion Regulation. There was no significant association between linguistic distancing and the emotion regulation composite score, \( r(30) = .25, p = .17, 95\% \text{ CI} [-.108, .551] \). Further, there was a marginal negative association between linguistic distancing and difficulties in emotion regulation (i.e., DERS scores) \((M = 75.3, SD = 20.4), r(30) = -.32, p = .079, 95\% \text{ CI} [-.598, .038]\).

Association between linguistic distancing and health indicators: Far Group.
Emotion Regulation. Within the Far group (Figure S4), there was a significant positive association between linguistic distancing and the emotion regulation composite score, \( r(29) = .44, p = .013, 95\% \text{ CI } [.101, .687] \). Participants with greater linguistic distancing showed a significant positive association with reappraisal frequency as measured by the ERQ \( (M = 29.9, SD = 6.1) \), \( r(29) = .45, p = .010, 95\% \text{ CI } [.118, .696] \), and a marginal negative association with difficulties in emotion regulation (i.e., DERS scores) \( (M = 78.6, SD = 18.5) \), \( r(29) = -.31, p = .091, 95\% \text{ CI } [-.598, .051] \). No other relationships were significant (Table 1).

We further quantitatively examined differences in correlation magnitude between the Objective and Far groups between linguistic distancing and each health indicator, and no correlation differences were significant. There were also no significant relationships between linguistic distancing and each of the remaining subscales of the SF-36 (i.e., physical functioning, role limitations due to physical health, etc.) in any of the groups.

Discussion

Summary of Results.

In this study, we sought to examine the relationship between expressive writing, emotion regulation, and validated questionnaire measures of overall health. We found that when individuals are manipulated to use language reflective of psychological distancing, positive relationships were present between linguistic distancing and several indicators of health and wellness. Across both psychological distancing groups, linguistic distancing was associated with lower negative affectivity (lower perceived stress and symptoms of depression), better general well-being (better emotional well-being and energy and vitality), and better emotion regulation (greater reappraisal frequency and fewer difficulties in emotion regulation). When individuals were manipulated to specifically use objective language, linguistic distancing was associated with lower negative
affectivity (lower symptoms of depression and perceived stress), better general well-being (better emotional well-being, social functioning, and energy and vitality), and better emotion regulation as well (fewer difficulties in emotion regulation). When individuals were manipulated to specifically use far language, linguistic distancing was associated with better emotion regulation (greater reappraisal frequency and fewer difficulties in emotion regulation).

Though correlational, the present study provides additional insight into the mechanisms connecting emotion regulation, language, and psychological and health-related indicators. Nook and colleagues showed that spontaneously engaging in linguistic distancing during reappraisal (i.e., after having been given instructions to reinterpret the meaning of a negative image rather than engage in distancing) was positively associated with increasing reappraisal success (defined as greater reductions in self-reported negative affect due to reappraisal). While self-reported negative affect ratings did indicate significant reappraisal success overall in the present study, the lack of significant relationships between linguistic distancing and reappraisal success in the current results may be due to several factors, including potentially greater sensitivity and less restrictive range in the measured health indicators relative to reappraisal success. Future work with larger samples may further examine relationships between linguistic distancing and reappraisal success. Notably, the data presented are primarily informative about the existence and direction of the relationships more so than the magnitudes of the correlations. Future work involving larger samples may provide more reliable estimates of correlation effect sizes.

**Links to Previous Research.**

In addition, the present results suggest that incorporating lexical shifts reflective of distancing may be adaptive. While previous research has elucidated linkages among explicit reappraisal frequency across multiple tactics and some adaptive health indicators, such as
depression, life-satisfaction, and well-being (Gross & John, 2003), our results indicate for the first
time that overall linguistic distancing in particular is associated with several adaptive health
indicators. Thus, the present work builds on an emerging body of research on the adaptiveness of
distancing as a tool in one’s emotion regulation repertoire (Ayduk & Kross, 2008; Kross & Ayduk,

The present results are also relevant to prior work on expressive writing. Substantiating the
promise of expressive writing as a means to regulate emotion, a meta-analysis of 146 studies on
experimental disclosure found that disclosing thoughts and feelings about personal and meaningful
topics is beneficial for psychological and physical health (Frattaroli, 2006). Other examinations of
the efficacy of expressive writing interventions on improving health outcomes have yielded
divergent conclusions, however. A meta-analysis of 64 randomized studies on the effect
of expressive writing on depressive symptoms found that brief, self-directed expressive writing is
not efficacious in reducing depressive symptoms among healthy adults with varying levels
of stress (Reinhold, Bürkner, & Holling, 2018). However, the present results suggest that focused,
task-driven expressive writing specifically reflective of psychological distancing may be
associated with positive health outcomes. Overall, these results suggest that expressive writing,
and the emotional granularity and complexity that this entails, may be an important linguistic
mechanism underlying some of the adaptive effects of emotion regulation (and reappraisal, in
particular) that drive health benefits in general (Kashdan, Barrett, & McKnight, 2015).”

Further, a recent quantitative meta-analysis on distancing proposes a taxonomy of the
subordinate distancing tactics; the authors outline how distancing can be in the form of (1) space,
(2) time, or (3) objectivity (Powers & LaBar, in press). In the present study, we chose to
investigate space and time within one group and objectivity in the second group given prior work
that has linked spatial and temporal aspects of distancing. In particular, previous research that
separately manipulated spatial and temporal distance (Nook et al., 2017; Parkinson, Liu, &
Wheatley, 2014) found evidence for “spillage” or “bleed over” between the two tactics; thus, the
authors have argued that there is evidence that spatial and temporal distancing reflect a more
common underlying core distancing construct (cf. Kross & Ayduk, 2016). Other research has
also investigated spatial and temporal distance and found evidence of a common underlying
construct for distancing (Doré, Ort, Braverman, & Ochsner, 2015). Therefore, while construal
level theory posits that indeed there is a common distancing construct underlying all of spatial,
temporal, and objective distancing (Trope & Liberman, 2010), for efficiency’s sake, in this
study, we combined spatial and temporal distancing into one group to compare versus objective
distancing. In the present study, while spatial/temporal and objective distancing did not result in
significantly different reductions in self-reported negative affect nor significantly different
degrees of linguistic distancing, the objective group did, indeed, have a greater number of
significant correlations with positive health indicators than the spatial/temporal distance group,
alluding to potentially different mechanisms underlying these tactics. Future work may continue
to explore potentially divergent consequences, however, among spatial, temporal, and objective
distancing separately.

We were primarily interested in looking at relationships between linguistic distancing and
negative affectivity, general health and well-being, and emotion regulation. In the present study,
individuals who implemented more linguistic distancing reported having lower perceived stress.
Reducions in perceived stress have been reported as a function of receiving explicit longitudinal
training in psychological distancing (Denny & Ochsner, 2014). The perceived stress measure used
in the present study has been shown to reliably predict depressive symptoms and vulnerability to
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466 depression in otherwise healthy adults (Cohen et al., 1983; Hewitt, Flett, & Mosher, 1992), and
467 thus the present work substantiates the relevance of linguistic distancing to clinically-meaningful
468 health indicators, including perceived stress, self-reported depressive symptoms, and difficulties
469 using emotion regulation.

470 The present study also indexed general health including energy and vitality, emotional
471 well-being, and social functioning. Previous literature supports the relationship between emotion
472 regulation and vitality. For example, a study on 6,025 participants who completed the General
473 Well-being schedule found that individuals with high levels of emotional vitality – a measure of
474 energy, positive well-being, and effective emotion regulation – had lower risk of coronary heart
475 disease relative to individuals with low levels of emotional vitality (Kubzansky & Thurston, 2007).

476 The present study elucidates connections between linguistic distancing and emotional well-being
477 and builds upon prior work; for example, in one study, individuals who report using reappraisal
478 frequently in their day-to-day life showed fewer depressive symptoms, more life satisfaction, more
479 optimism, had better self-esteem, and higher levels of personal growth, self-acceptance,
480 environmental mastery, and clear purpose in life (Gross & John, 2003). The present work extends
481 some of these benefits to the degree of linguistic distancing in particular during appraisal of
482 negative stimuli. In addition, the present study shows links between linguistic distancing and social
483 functioning. Reappraisal has been shown to predict stronger social connections and favorable
484 sociometric standing in college students (English et al., 2012). Thus, the present results, while
485 correlational, suggest that linguistic distancing may play a role in fostering such psychological
486 well-being and strong social relationships.

487 Future Directions & Limitations.
Overall, the present study may have implications in translational and clinical domains (Kross & Ayduk, 2017). The present results substantiate the idea that language may be used as a target for efficacious psychotherapies. While no significant differences in correlation strength between linguistic distancing and health indicators were found between the Objective and Far groups, intriguingly, there were more health indicators significantly associated with objective distancing relative to far distancing. It is important to note, however, that the difference between “significant” and “not significant” is not itself statistically significant (Gelman & Stern, 2006). While speculative given the lack of between-group differences, this may suggest that distancing using objective means (i.e., appraising negative situations as an objective, rational, impartial observer) may be more promising as a therapeutic “main ingredient” relative to distancing using modulations of perceived spatial and temporal distance, per se. Future work may continue to examine this possibility, as well as relevant individual difference factors that may predispose some individuals to be more receptive to one reappraisal sub-tactic relative to another.

It is important to note that the present findings are correlational in nature. Hence, causality cannot be established by the current data; it could be that psychological distancing leads to better health outcomes, or it could be that better health leads to more effective use of distancing when language is manipulated to incorporate lexical shifts. Causality may be explicitly tested in future work via longitudinal designs examining the long-term health consequences of linguistic emotion regulation using different tactics (e.g., distancing versus other forms of reappraisal) and between distancing sub-tactics (e.g., objective versus far distancing). Relatedly, future work may further unpack the correlates of linguistic distancing using additional sub-tactics, including separately examining spatial and temporal distancing. If individuals are trained to implement more linguistic distancing, they may show decreases in their perceived stress and increases in their general health.
over time. Consistent with this idea, Kross and colleagues suggest that individuals with major
depression and social anxiety may benefit from linguistic distancing, as self-distancing strategies
facilitate coping with distressing situations (Kross et al., 2014).

Indeed, psychological distancing is a cognitive reappraisal tactic with significant potential
to be used in a therapeutic setting. For example, clinical trials for depression and PTSD indicate
that practicing the ability to distance oneself is a flexible strategy that may be implemented in
clinical practice (Ayduk & Kross, 2010; Kross & Ayduk, 2017). Therefore, language, and in
particular language incorporating psychological distancing, may represent a particularly effective
target for mental health interventions designed to foster adaptive emotion regulation.

That said, as with any emotion regulation strategy, it will be crucial to investigate for whom
and under which circumstances distancing may be most and least appropriate (Doré, Silvers, &
Ochsner, 2016), and how to flexibly select when to implement distancing and/or other emotion
regulation strategies (Gross, 2015b), which represents an important skill of its own and a key area
of future study.

Overall, the findings of this study illustrate relationships among language, emotion
regulation, and validated health indicators. Based on these results, future work may further
examine whether and how, when implemented in an appropriate context, linguistic distancing
manipulations may be an effective tool to foster adaptive health outcomes.
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Table 1. Correlations of Linguistic Distancing Metric Collapsed Across Psychological Distancing Groups and Within Each Group

<table>
<thead>
<tr>
<th>Health Indicator</th>
<th>Collapsed Across Objective and Far</th>
<th>Objective</th>
<th>Far</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Negative Affectivity (Composite)</strong></td>
<td>$r = -.301^*, p = .017$</td>
<td>$r = -.450^*, p = .010$</td>
<td>$r = -.200, p = .281$</td>
</tr>
<tr>
<td>Depression Symptoms</td>
<td>$r = -.266^*, p = .035$</td>
<td>$r = -.442^*, p = .011$</td>
<td>$r = -.124, p = .887$</td>
</tr>
<tr>
<td>Perceived Stress</td>
<td>$r = -.311^*, p = .013$</td>
<td>$r = -.427^*, p = .015$</td>
<td>$r = -.252, p = .171$</td>
</tr>
<tr>
<td><strong>General Well-Being (Composite)</strong></td>
<td>$r = .276^*, p = .029$</td>
<td>$r = .414^*, p = .018$</td>
<td>$r = .175, p = .345$</td>
</tr>
<tr>
<td>Energy and Vitality</td>
<td>$r = .232^*, p = .066$</td>
<td>$r = .352^*, p = .048$</td>
<td>$r = .176, p = .343$</td>
</tr>
<tr>
<td>Emotional Well-Being</td>
<td>$r = .291^*, p = .021$</td>
<td>$r = .411^*, p = .019$</td>
<td>$r = .172, p = .354$</td>
</tr>
<tr>
<td>Social Functioning</td>
<td>$r = .194, p = .127$</td>
<td>$r = .355^*, p = .046$</td>
<td>$r = .087, p = .640$</td>
</tr>
<tr>
<td><strong>Emotion Regulation (Composite)</strong></td>
<td>$r = .326^*, p = .009$</td>
<td>$r = .250, p = .168$</td>
<td>$r = .440^*, p = .013$</td>
</tr>
<tr>
<td>Reappraisal Frequency</td>
<td>$r = .272^*, p = .031$</td>
<td>$r = .108, p = .556$</td>
<td>$r = .454^*, p = .010$</td>
</tr>
<tr>
<td>Difficulties in Emotion Regulation</td>
<td>$r = -.287^*, p = .022$</td>
<td>$r = -.315^*, p = .079$</td>
<td>$r = -.309^*, p = .091$</td>
</tr>
</tbody>
</table>

Notes: *indicates significance at the .05 level (2-tailed), †indicates marginal significance at the .10 level (2-tailed).
For the Objective and Far groups, the linguistic distancing metric was calculated by subtracting the Look Negative linguistic distancing score from the Change Negative linguistic distancing score.
Figure 1. Linguistic Distancing composite metric within each trial type within each group. Error bars represent ± one standard error.
Figure 2. Collapsing across the psychological distancing groups, there was a significant association between the linguistic distancing composite metric and (A) perceived stress ($r(61) = -0.31, p = .013$), (B) symptoms of depression ($r(61) = -0.27, p = .035$), (C) emotional well-being, ($r(61) = 0.29, p = .021$), and (D) difficulties in emotion regulation, ($r(61) = -0.29, p = .022$).