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Abstract

Health behavior accounts for upwards of 40% of incident cardiovascular disease (CVD) risk. Prior research on stress and CVD has been informative, yet significant gaps remain in our understanding of the basic mechanistic pathways and processes linking stress exposure/perceptions to health behaviors. We also don't understand how individual differences in personal resources and vulnerabilities buffer or aggravate the impact of stress on these behaviors. Our ability to assess complex, potentially bi-directional associations of stress exposure/perception to behavior has been limited by our theoretical, measurement, and statistical models.

Using recent methodological, technological, and statistical advances, and coupling ecological momentary assessment with smartphone technology and actigraphy, our Primary Aim is to ascertain both the effect of momentary stress perception on whether an individual engages in exercise, and whether engaging in exercise in turn influences the subsequent perception of stress among 60 intermittently exercising adults. With 6 months of observational data we will build personalized models of stress perception and exercise, with an additional focus on the sources of perceived stress, and provide this information to 30 of the 60 participants in a randomized manner, and continue to observe all participants for six additional months. This design will test our novel hypothesis that personalized within-subject models of stress and exercise better predicts exercise than our traditional between-subject models, and that personalized stress knowledge will increase exercise.

We hypothesize that, 1) Ecologically assessed individual perceptions of psychosocial stress are inversely associated with the probability of subsequently engaging in actigraphy-assessed exercise; 2) Actigraphyassessed exercise is inversely associated with subsequent perceptions of psychosocial stress (acutely postexercise and end-of-day summary for the day). We will also explore: 1) if there are person-specific sources of stress exposure for the exercise-predictive momentary stress perceptions; 2) if those randomized to receiving information on their personalized "stress fingerprint" – those stress sources associated with decreased exercise – both decrease their exposure to those stressors and increase their exercise; and 3) if life stressors (e.g., marital, work, financial), resources (e.g., social support, financial), and personal vulnerabilities (e.g., early childhood adversity) are moderators of the bi-directional relationship between stress perception and exercise.

Significance: This is the first study designed to document the bi-directional relationship between personalized stress and exercise in real-time over an extended period. By using innovative within-person models, we may find that personalized treatment targets better aid us in decreasing stress, and improving regular exercise behavior – two elusive public health goals. The development of a person-specific methodology to understanding stress and behavior could revolutionize the way we conceptualize and treat highly prevalent, hitherto baffling health behaviors.