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<b>14. ABSTRACT</b> <p>This study is a longitudinal follow-up of Soldiers who completed surveys before, during, and after their deployment to Iraq to examine the effects of deployment in the longer term using both survey and interview methods. A comprehensive set of psychosocial characteristics—healthy and unhealthy—were assessed. Further data collection is ongoing. The specific purpose of the study is to measure resilience and growth in terms of actual trajectories of functioning over time and to identify protective factors and assets predicting resilience (relatively rapid return to healthy functioning following adversity) as well as factors predicting growth (improved functioning).</p> <p>Achievements during the third year of the project include completing survey data collection, securing IRB continuing review approvals, developing interview protocol, upgrading database for contact information for participant follow-up data collection, conducting preliminary data analyses of four waves of data, and developing strategies for follow up interview data collection.</p> <p>Preliminary data analyses with four waves data found that during deployment, Soldiers frequently experienced adverse events and their mental well-being decreased. However, post-deployment, Soldiers on average had the similar level of psychological well-being as before deployment, evidence of resilience. Factors predicting well-being following deployment included positive affect, and optimism; flexible attitude; problem-focused coping strategies with stress; social and family support; and life meaning. These similar factors predicted reports of growth following deployment, although variables reflecting meaning were more strongly related to post-deployment growth compared to post-deployment psychological well-being. Also, good leadership predicted growth following deployment.</p>					
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## **Introduction**

Soldiers face ever-growing challenges due to repeated deployments to combat. While deployment-related stress may lead to problems, many Soldiers maintain relatively healthy functioning. It is critical to understand the factors related to healthy and unhealthy functioning.

This study is a continuation of an on-going longitudinal investigation of US Soldiers. More than 550 Soldiers in the 4<sup>th</sup> Infantry Division of the US Army completed surveys about psychosocial well-being before (Time 1: February, 2008), during (Time 2: July, 2008), and immediately after (Time 3: May, 2009) deployment to Iraq. Current grant funding supports for the fourth wave of data collection and data analyses of entire waves. It involves multiple waves of data collection and an assessment of both positive and negative functioning in various life domains using survey and interview methods.

The specific purpose of the study is to measure resilience and growth in terms of actual trajectories of psychological functioning over time and then to investigate the psychological, social, and organizational protective factors and assets that predict resilience (relatively rapid return to healthy functioning following adversity) as well as the factors that predict growth (improved psychological functioning following adversity). Resulting from this effort, which relies on quantitative and qualitative data, will be a comprehensive characterization of resilient Soldiers, as well as those who may grow following adversity. The important benefit of the characterizations that emerge will be the identification of specific intervention targets for resilience and growth training programs in the military that are conceptually-grounded and empirically-informed.

## **Body**

At the third year of our project, our main task was the completion of the follow-up survey data collection as it was described in our statement of work (SOW). Due to unexpected challenges resulting from the sudden death of co-PI, Dr. Chris Peterson, there have been delays in progress of the proposed project. Furthermore, follow up data collection has been extremely challenging. A large number of participants have left the military, been redeployed, or relocated and reassigned to different positions; much of our contact information was outdated. It has been very challenging to track down each of our potential participants and recruit them for our follow-up survey. We tried all available methods to reach potential participants including e-mail, regular mail, phone and social media like Facebook. We were able to secure our minimum target enrollment (200) for follow-up data collection.

Details of research accomplishments during the past one year funding period are following:

- 1) completed follow-up survey data collection, 2) hired research assistants and provided training, 3) developed data management system and set up and cleaned up computer database with four waves of data, 4) conducted preliminary data analyses of four waves of data to inform follow-up data collection, 5) reviewed recent literature to interview protocol for new data collection, 6) secured IRB annual review approval from University

of Michigan and HRPO (see Appendix), 7) attended data analyses workshops on longitudinal data analyses and data management, 8) presented primary findings at MOMRP annual science review meeting and International Positive Psychology World Congress (See appendix for copy of presentation).

We are behind our schedule for collecting follow-up interview data collection. We expect continuing challenges in further follow-up interview data collection due to constantly changing and outdated contact information and the major loss of our team member. We have faced challenges tracking down each of our potential participants and encouraging them to participate.

During the past few years, Soldiers in the 4th Infantry Division study completed surveys before (February, 2008), during (July, 2008), immediately after (May, 2009), and long after (2011-2013) their deployment to Iraq. A comprehensive set of psychosocial characteristics—healthy and unhealthy—were assessed. Also assessed was the experience of potentially-traumatic events, such as threats to one's own life; injuries; loss of friends and comrades in combat; degree of combat exposure; and marital problems.

Here is a summary of major findings from preliminary analyses of four waves of data. During deployment, Soldiers frequently experienced adverse events. However, post-deployment, Soldiers on average had about the same psychological well-being as before deployment, on the face of it evidence of their resilience. The factors that predicted well-being following deployment included those emphasized in the Comprehensive Soldier Fitness Program: psychological fitness (e.g., positive affect, optimism); social fitness (e.g., unit cohesion and trust, social support); family fitness (e.g., family support); and spiritual fitness (e.g., orientation to meaning, meaning-making) (Peterson, Park & Castro, 2011). These similar factors also predicted reports of growth following deployment. However, variables reflecting meaning were more strongly related to post-deployment growth compared to post-deployment psychological well-being. Good leadership such as trust and transparency of leader also predicted growth following deployment.

Further analyses are planned for the fourth year of the project, especially of responses to open-ended questions, which will flesh out the quantitative results. And subsequent interview data will shed light on the more in depth analyses of well-being and growth processes.

### **Preliminary Findings**

Survey data from three waves before (February, 2008), during (July, 2008), soon after (May, 2009), and long after (3-4 years after) their deployment to Iraq has been entered, cleaned and merged. Details of preliminary data analyses are following.

At the first wave of data collection, 748 Soldiers completed measures. Almost all were males 98%. Their average age was 25 years, and on average, they had served in the Army for 4.4 years. Participants were for the most part distributed across the enlisted ranks—31% Privates, 29% Specialists, and 30% Sergeants—and across ethnicities—65% White, 14% Latino, and 12% African American. About 60% of participants were married, and on average, participants had one

child. All had high school degrees or the equivalent, and 49% had some college credits. At the second wave of data collection, 551 (74%) of the original participants again completed surveys, and at the third wave, 616 (83%) of the original participants completed surveys. For the long term follow-up, fourth wave of data collection, 200 (27%) of the original participants completed surveys.

Here we look at psychological outcomes at Wave 4 as a function of predictors assessed at Wave 2 and 3, controlling for baseline measures of well-being at Wave 1. There are other potential predictors assessed at Waves 1, 2, and 3, but these are not on focus here because the present analyses made full use of the study's longitudinal design and clearly separated the assessment of outcomes (Wave 4), predictors (Wave 2 and 3), and covariates (Wave 1). Several questions were posed.

Questionnaires were either created for the current study or derived from existing measures: Satisfaction With Life Scale (Diener, Emmons, Larsen, & Griffin, 1985); PANAS (Watson, Clark, & Tellegen, 1988); Brief Cope (Carver, 1997); Meaning in Life Scale (Steger, Frazier, Oishi, & Kaler, 2006.); Orientation to Happiness (Peterson, Park, & Seligman, 2005); PSYCCAP (Luthans, Avolio, Avey, & Norman, 2007); Hardiness (Bartone, 2007); Big Five (Goldberg, 1992); Mattering (Taylor & Turner, 2001); Short-Form Mississippi PTSD (Fontana & Rosenheck, 1994); CES-D (Radloff, 1977); Post Traumatic Growth Inventory (Tedeschi & Calhoun, 1996); Authentic Leadership (Walumbwa, Avolio, Gardner, Wernsing, & Peterson, 2008 ); Multidimensional Leadership Questionnaire (Bass & Avolio, 1990).

***First, how frequently are Soldiers exposed to potentially traumatic events?***

Looking at Wave 4 results, which are cumulative, the typical Soldier in our sample was frequently exposed to potentially traumatic events (see Table 1).

*Table 1*  
*Exposure to Potentially Traumatic Events at Wave 4*

<u>Event</u>	<u>Average / Frequency</u>
Months in combat zone	13-36
Number of deployments	2.5
Direct fire engagements	1-20+
Lost a close friend/comrade in combat?	87%

***Second, are there “main effects” (i.e., typical responses) of deployment?***

To answer this question, we looked at mean scores of Soldiers at the four waves for satisfaction with life; depressive symptoms; post-traumatic disorder symptoms; positive affect; negative affect; and post-traumatic growth. There were no striking differences over waves Table 3). Said more positively, Soldiers on average returned from deployment not appreciably different in terms of their psychological well-being before deployment, evidence for their resilience. Of course, some Soldiers “improved” on measures from Wave 1 before deployment to Wave 4

following deployment, and others did not, as would be expected.

*Table 2*  
*Well-Being Across Waves*

Measure	Wave 1	Wave 2	Wave 3	Wave4	Improvement*
Life satisfaction	4.18	4.26	4.39	4.70	62%
Depression	16.1	18.9	20.2	16.0	43%
PTSD	22.5	22.2	23.6	24.3	34%
Positive affect	2.39	1.90	2.40	2.46	47%
Negative affect	1.64	1.64	1.77	1.50	50%
Growth	53.2	42.6	50.4	57.4	56%

\*Percent of sample improved from Wave 1 to Wave 4.

A comment about “growth” is in order. The Post-Traumatic Growth Inventory (PTGI) was completed at each of the four waves, and average scores were computed and are reported in Table 2. One might think that growth would be continual and cumulative, but scores actually declined at Wave 2, and 56% of the sample reported more growth at Wave 4 than at Wave 1. Caution about the interpretation of the PTGI is underscored. If we take the result as it is, more than half of Soldiers reported more positive growth experiences in their life after deployment compared to before deployment.

### *Third, what predicts Soldier well-being after deployment?*

Despite the absence of a typical response to deployment, it is still possible to look at factors that predict well-being after deployment. “Well-being” was measured by satisfaction with life, low depressive symptoms, and low post-traumatic disorder symptoms. Analyses explored which factors during deployment Wave 2 and Wave 3 predicted well-being at Wave 4—following deployment by controlling for age and gender of Soldiers and months in a combat zone (see Table 3).

*Table 3*  
*Wave 2 and Wave 3 Predictors of Well-Being at Wave 4*

Predictors	Well-Being at Wave 4 Standardized Beta Coefficient*	
	Wave 2 Predictors	Wave 3 predictors
<b>Emotion</b>		
Positive affect	.32 (p < .001)	.29 (p < .005)
Negative affect	-.38 (p < .001)	-.38 (p < .001)
Orientation to pleasure	.14 (ns)	.22 (p < .05)
Orientation to engagement	.08 (ns)	.35 (p < .001)

<b>Meaning</b>		
Orientation to meaning	.14 (ns)	.23 (p<.05)
Meaning making	.14 (ns)	.21 (p<.05)
Search for meaning	-.02 (ns)	.16 (ns)
<b>Hope / optimism</b>		
Efficacy	.23 (p<.03)	NA
Hope / perseverance	.41 (p<.00)	NA
Resilience	.30 (p<.005)	NA
Optimism	.21 (p<.05)	NA
Positive expectations about rest of deployment	.24 (p < .02)	NA
<b>Coping</b>		
Keeping negative emotions to oneself	-.12 (ns)	-.22 (p<.05)
Expressing positive emotions	.23 (p < .05)	.23 (p<.05)
Cognitive reappraisal	.12 (ns)	.18 (p<.06)
Problem-focused coping	.22 (p < .05)	.36 (p<.001)
Flexibility	.21 (p < .05)	.21 (p<.05)
Control and acceptance	.10 (ns)	.16 (p<.09)
<b>Social</b>		
Social support	.33 (p < .001)	.20 (p < .05)
Family support	.27 (p < .008)	.28 (p < .005)
Unit will take care of family	.22 (p < .05)	.17 (p<.08)
Team efficacy	.17 (ns)	.10 (ns)
Team social cohesion	.11 (ns)	.10 (ns)
Trusted by leader	.11 (ns)	.16 (ns)
Leader trust in subordinates	.07 (ns)	.00(ns)
<b>Leadership</b>		
A. Supervisor transparency	.06 (ns)	NA
B. Authentic Leadership	.00 (ns)	NA
C. MLQ		
Transformational leadership total	-.02 (ns)	NA

\*Controlling for Wave 1 outcome, age, gender, and Wave 4 months in a combat zone.

A number of factors, considered one at a time, proved relevant, by far the most robust of which was always well-being before deployment (life satisfaction  $\beta = .44$ ,  $p < .001$ ; depression  $\beta = -.40$ ,  $p < .001$ ; PTSD  $\beta = -.33$ ,  $p < .001$ ), reprising the familiar finding that how one fares before adversity predicts how one fares after adversity. Other predictive factors included positive affect

and negative affect; hope/perseverance, optimism, resilience, and efficacy; positive expectations about deployment; meaning and purpose; engagement in ongoing activities; strategies for coping with stress; social support; family support; and trust that the unit would care for one's family.

Not appreciably implicated in these preliminary findings were factors related to Soldier perceptions of leadership. This may be due to the starkness of the preliminary analyses, to the lack of meaningful variation in these factors, or—most interestingly—to something inherent in the contemporary US Army. Further and more sophisticated analyses are of course needed before definitive conclusions are drawn.

The implications of these results, although preliminary, are straight-forward. In recruiting and especially in deploying Soldiers to combat, the most psychosocially fit individuals should be chosen; they are the ones who fare best following deployment. Moreover, deliberate programs to encourage fitness in one or more psychosocial domains might encourage psychological well-being among Soldiers following combat.

#### ***Fourth, what predicts reports of post-traumatic growth after deployment?***

As mentioned, caution is needed about typical measures of post-traumatic growth following adversity that rely on self-report (Frazier et al., 2009). We nonetheless looked at the factors that predicted higher-versus-lower reports of growth following deployment. We looked at Wave 4 PTGI scores controlling for age, gender, and months in a combat zone (see Table 4). Virtually all of the Soldiers in the present study experienced potentially traumatic events (see Table 1).

*Table 4*

*Wave 2 and Wave 3 Predictors of Posttraumatic Growth at Wave 4*

Predictors	Posttraumatic Growth at Wave 4 Standardized Beta Coefficient*	
	Wave 2 Predictors	Wave 3 predictors
<b>Emotion</b>		
Positive affect	.26 (p <.01)	.35 (p<.001)
Negative affect	-.06 (ns)	-.18 (p<.06)
Orientation to pleasure	.24 (p<.05)	.24 (p<.05)
Orientation to engagement	.19 (p<.08)	.33 (p<.001)
<b>Meaning</b>		
Orientation to meaning	.27 (p<.01)	.36 (p<.001)
Meaning making	.44 (p<.001)	.34 (p<.001)
Search for meaning	.08 (ns)	.32 (p<.001)
<b>Hope / optimism</b>		
Efficacy	.20 (p<.07)	NA
Hope / perseverance	.30 (p<.005)	NA

Resilience	.11 (ns)	NA
Optimism	.36 (p<.001)	NA
Positive expectations about rest of deployment	.12 (ns)	NA
<b>Coping</b>		
Keeping negative emotions to oneself	-.17 (ns)	-.20 (p<.05)
Expressing positive emotions	.31 (p<.005)	.33 (p<.001)
Cognitive reappraisal	.37 (p<.001)	.44 (p<.001)
Problem-focused coping	.11 (ns)	.17 (p<.07)
Flexibility	.28 (p<.008)	.26 (p<.007)
Control and acceptance	.05 (ns)	.15(ns)
<b>Social</b>		
Social support	.37 (p<.001)	.34 (p<.001)
Family support	.26 (p<.01)	.24 (p<.01)
Unit will take care of family	.23 (p<.05)	.24 (p<.05)
Team efficacy	.24 (p<.05)	.25 (p<.05)
Team social cohesion	.14 (ns)	.50 (p<.001)
Trusted by leader	.29 (p<.05)	.12 (ns)
Leader trust in subordinates	.07 (ns)	.14 (ns)
<b>Leadership</b>		
A. Supervisor transparency	.25 (p<.05)	NA
B. Authentic Leadership	.14 (ns)	NA
C. MLQ		
Transformational leadership total	.16 (ns)	NA

\*Controlling for Wave 1 outcome, age, gender, and Wave 4 months in a combat zone.

Results were in general similar to those just reported for the predictors of changes in well-being following deployment. Exceptions were the variables reflecting meaning, which were more strongly related to post-deployment growth compared to post-deployment psychological well-being. Perhaps growth after adversity at its essence entails making sense of what happened.

Also, perceptions of positive aspects of leadership were more associated post-deployment growth than with post-deployment well-being. These results suggest that leadership, especially supervisor transparency and leader trust, has effects on post-traumatic growth not apparent when the focus is on psychological well-being *per se*. Perhaps good leaders help Soldiers make sense of adversity and thereby grow from the experience.

Although self-reported growth and psychological well-being at Wave 4 were positively associated, the magnitude was relatively moderate ( $r = .40$ ,  $p < .001$ ) and it was almost same

even when Wave 1 well-being was controlled ( $r = .405, p < .001$ ).

On the face of it, post-traumatic growth as measured by the PTGI and psychological well-being as measured by life satisfaction and low levels of depression and PTSD may not same constructs, a conclusion with theoretical and practical implications (cf. Westphal & Bonanno, 2007). Soldiers may grow from combat yet still be dissatisfied and symptomatic. Conversely, other Soldiers may do psychologically well following combat without the occurrence of post-traumatic growth.

We desire our Soldiers to not only be resilient (psychological well-being) but also grow from the challenges at work and in life. If so, we cannot assume that interventions to enhance the one outcome will have necessary effects on the other, or vice versa.

There have been challenges that have delayed the progress of the proposed project. We expect further challenges in future follow-up interview data collection. A number of factors contribute to this challenge. There has been a significant time lag since we collected the last wave of survey data in 2011-2013, which left 1-3 years of loss of contact with participants. Furthermore, there has been a substantial change in the status of participants in the study. Since the last major data collection in 2009, a large number of participants have left the military, been redeployed, or relocated and reassigned to different positions. As a result, much of our contact information is outdated. We have faced challenges tracking down each of our potential participants and encouraging them to participate. We are planning to utilize all possible ways of contacting participants including e-mail, regular mail, phone calls, and social media (e.g., Facebook).

Furthermore, personal follow-up interviews will take 1-2 hours through mostly the phone or in-person in some cases. This project has lost its co-PI from sudden death and has lost trained research assistants due to graduation and personal reasons. It is a challenging and time-consuming process to recruit new research assistants and train them. So, all interviews will be carried out by the PI. Conducting in-depth individual interviews will be time-consuming. Securing private time for the interview and finding locations for each interviewee might be challenging. To encourage participants and secure the quality of the interviews, we plan to increase incentives for the participation. We will seek IRB approval for new plan. Also, given the time limit, we plan to request an extension for the project timeline without additional funds. Although, it is challenging, we are doing our best and expect to reach our goal to complete our proposed project.

### **Key Research Accomplishments**

Achievements during the first year of the project include:

- securing IRB annual review approvals
- completing follow-up survey data collection
- upgrading database for contact information for participant follow-up data collection
- Merging wave 4 data with existing three waves of data to create the master database
- Organizing and cleaning four waves of data

- conducting preliminary data analyses of four waves of data to inform follow-up data collection
- Presented preliminary findings at the international conference
- Developing strategies for recruiting participants for follow-up interview data collection
- Recruited and hired new research assistants

Here are the major findings from preliminary analyses of the four waves of data:

- During deployment, Soldiers frequently experienced adverse events.
- During deployment, Soldiers' mental health was decreased on average.
- Post-deployment, Soldiers on average had similar levels of psychological well-being as before deployment, evidence of their resilience.
- The most important contributor for Soldier well-being, after deployment was well-being before deployment.
- The factors that predicted well-being following deployment included those emphasized in the Comprehensive Soldier Fitness (CSF) Program: psychological fitness (e.g., high positive affect, low negative affect, optimism, active coping, self-efficacy, emotion regulation, engagement in life, ); social fitness (e.g., unit cohesion and trust, social support, trust that the military unit would take care of one's family); family fitness (e.g., family support); and spiritual fitness (e.g., having life meaning, meaning-making).
- These similar factors also predicted reports of growth following deployment, although variables reflecting meaning were stronger predictors in growth after deployment.
- Also predicting reports of growth following deployment was good leadership.

## **Reportable Outcomes**

### **Publications**

Park, N., Peterson, C., Szvarca, D., Molen, R.J.V., D., Kim, E. S., & Collon, K. (in press). Positive Psychology and Physical Health: Research and Applications. *The American Journal of Lifestyle Medicine*. (See Appendix)

Peterson, C., & Park, N. (in press). Meaning and positive psychology. *International Journal of Existential Psychology and Psychotherapy*, 4

### **Presentations**

Park, N. (2013, August). *Characterizing resilience and growth among soldiers: A trajectory study*. Invited speaker. Military Operational Medicine Research Program (MOMRP) Psychological Resilience IPR Meeting. Fort Detrick, MD.

Park, N. (2013, June). *The Good Life*. Invited speaker. 2013 International Positive Psychology Association World Congress, Los Angeles, CA.

Park, N., Sun, J., Szvarca, D., Erwin, M., & Peterson, C. (2013, June). *Longitudinal study of Resilience and Growth Among Soldiers: Preliminary findings*. Poster presentation. 2013 International Positive Psychology Association World Congress, Los Angeles, CA.

Goldstein, A. & Park, N. (2013, June). *Positive Psychology in the Classroom: A Case of Positive Psychology Intervention for Special Education in High School*. Poster presentation. 2013 International Positive Psychology Association World Congress, Los Angeles, CA.

Crespo, F. & Park, N. (2013, June). *Clinical Applications of Positive Psychology to Addiction Treatment among French Speaking Clients*. Presentation. Health and Treatment: East and West. 2013 International Positive Psychology Association World Congress, Los Angeles, CA.

Park, N. (2013, June). *Positive Psychology and Positive Organization Development: Strength -based Approach*. Invited lecture. 2013 Positive Organization Design Seminar, Bloom Company, Seoul, Korea.

Park, N. (2013, April). *Self-Development for Positive Leadership: Strength - based Approach- Part 2*. Invited lecture. Executive Master of Positive Leadership and Strategy (EXMPLS), IE University, Madrid, Spain.

Park, N. (2013, April). *Self-Development for Positive Leadership: Strength - based Approach- Part 1*. Invited lecture. Executive Master of Positive Leadership and Strategy (EXMPLS), IE University, Madrid, Spain.

### Honors

- Nansook Park (PI) received a Fellow award from the International Positive Psychology Association (IPPA) (2013).
- Daniel Szvarca (research assistant) received the travel award from the Honors program at the University of Michigan to present research findings from the current project at the International Positive Psychology Association World Congress (2013).

### **Conclusions**

The implications of these results, although preliminary, are straight-forward. In recruiting and especially in deploying Soldiers to combat, the most psychosocially fit individuals should be chosen; they are the ones who fare best following deployment. Moreover, deliberate programs to encourage fitness in one or more psychosocial domains might encourage psychological well-being among Soldiers following combat. Current results showed that although the protective factors and assets for resilience and growth after deployment were similar, there were

differences. Variables reflecting life meaning and good leadership mattered more for post-deployment growth. Emerging from future in-depth interview data collection and data analyses will provide a comprehensive characterization of resilient Soldiers, as well as a characterization of those who grow following adversity.

The important benefit of the characterizations that emerge will be to provide specific intervention targets for resilience and growth training and educational programs in the military that are conceptually-grounded and empirically-informed. Existing resilience programs in the Army can be more efficient, more economical, and more effective if they focus on the most relevant factors that this study will discover.

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## Appendices

### 1. IRB continuing review approval

### 2. A copy of Presentation:

Park, N., Sun, J., Szvarca, D., Erwin, M., & Peterson, C. (2013, June). *Longitudinal study of Resilience and Growth Among Soldiers: Preliminary findings*. Poster presentation. 2013 International Positive Psychology Association World Congress, Los Angeles, CA.

### 3. Publications:

Park, N., Peterson, C., Szvarca, D., Molen, R.J.V., D., Kim, E. S., & Collon, K. (in press). Positive Psychology and Physical Health: Research and Applications. *The American Journal of Lifestyle Medicine*. (See Appendix)

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**eResearch Notification: Scheduled Continuing Review Approved**

1 message

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eresearch@umich.edu <eresearch@umich.edu>

Wed, Dec 4, 2013 at 5:16 PM

Reply-To: eresearch@umich.edu

To: nspark@umich.edu



Health Sciences and Behavioral Sciences Institutional Review Board • 540 East Liberty Street, Suite 202, Ann Arbor, MI 48104-2210 • phone (734) 936-0933 • fax (734) 998-9171 • [irhsbs@umich.edu](mailto:irhsbs@umich.edu)

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To: Nansook Park

From:

Thad Polk

Cc:

Jennifer Sun  
Nansook Park

Subject: Scheduled Continuing Review [CR00035760] Approved for [HUM00052542]

**SUBMISSION INFORMATION:**

Study Title: Resilience Among Soldiers - Followup

Full Study Title (if applicable): Characterizing Resilience and Growth Among Soldiers: A Trajectory Study - Followup

Study eResearch ID: [HUM00052542](#)

SCR eResearch ID: [CR00035760](#)

SCR Title: HUM00052542\_Continuing Review - Mon Jul 22 19:37:54 EDT 2013

Date of this Notification from IRB: 12/4/2013

Date Approval for this SCR: 12/4/2013

Current IRB Approval Period: 12/4/2013 - 12/3/2014

Expiration Date: Approval for this expires at 11:59 p.m. on 12/3/2014

UM Federalwide Assurance: FWA00004969 (For the current FWA expiration date, please visit the [UM HRPP Webpage](#))

OHRP IRB Registration Number(s): IRB00000246

Approved Risk Level(s) as of this Continuing Report:

Name	Risk Level
HUM00052542	No more than minimal risk

#### NOTICE OF IRB APPROVAL AND CONDITIONS:

The IRB HSBS has reviewed and approved the scheduled continuing review (SCR) submitted for the study referenced above. The IRB determined that the proposed research continues to conform with applicable guidelines, State and federal regulations, and the University of Michigan's Federalwide Assurance (FWA) with the Department of Health and Human Services (HHS). You must conduct this study in accordance with the description and information provided in the approved application and associated documents.

#### APPROVAL PERIOD AND EXPIRATION DATE:

The updated approval period for this study is listed above. Please note the expiration date. If the approval lapses, you may not conduct work on this study until appropriate approval has been re-established, except as necessary to eliminate apparent immediate hazards to research subjects or others. Should the latter occur, you must notify the IRB Office as soon as possible.

#### IMPORTANT REMINDERS AND ADDITIONAL INFORMATION FOR INVESTIGATORS

##### APPROVED STUDY DOCUMENTS:

You must use any date-stamped versions of recruitment materials and informed consent documents available in the eResearch workspace (referenced above). Date-stamped materials are available in the "Currently Approved Documents" section on the "Documents" tab.

In accordance with 45 CFR 46.111 and IRB practice, consent document(s) and process are considered as part of Continuing Review to ensure accuracy and completeness. The dates on the consent documents, if applicable, have been updated to reflect the date of Continuing Review approval.

##### RENEWAL/TERMINATION:

At least two months prior to the expiration date, you should submit a continuing review application either to renew or terminate the study. Failure to allow sufficient time for IRB review may result in a lapse of approval that may also affect any funding associated with the study.

##### AMENDMENTS:

All proposed changes to the study (e.g., personnel, procedures, or documents), must be approved in advance by the IRB through the amendment process, except as necessary to eliminate apparent immediate hazards to research subjects or others. Should the latter occur, you must notify the IRB Office as soon as possible.

##### AEs/ORIOs:

You must continue to inform the IRB of all unanticipated events, adverse events (AEs), and other reportable information and occurrences (ORIOs). These include but are not limited to events and/or information that may have physical, psychological, social, legal, or economic impact on the research subjects or others.

Investigators and research staff are responsible for reporting information concerning the approved research to the IRB in a timely fashion, understanding and adhering to the reporting guidance ([http://www.med.umich.edu/irbmed/ae\\_orio/index.htm](http://www.med.umich.edu/irbmed/ae_orio/index.htm)), and not implementing any changes to the research without IRB approval of the change via an amendment submission. When changes are

necessary to eliminate apparent immediate hazards to the subject, implement the change and report via an ORIO and/or amendment submission within 7 days after the action is taken. This includes all information with the potential to impact the risk or benefit assessments of the research.

**SUBMITTING VIA eRESEARCH:**

You can access the online forms for continuing review, amendments, and AE/ORIO reporting in the eResearch workspace for this approved study, referenced above.

**MORE INFORMATION:**

You can find additional information about UM's Human Research Protection Program (HRPP) in the Operations Manual and other documents available at: [www.research.umich.edu/hrpp](http://www.research.umich.edu/hrpp).

A handwritten signature in cursive script that reads "Thad A. Polk". The signature is written in black ink on a white background.

Thad Polk  
Chair, IRB HSBS



Nansook Park <nspark@umich.edu>

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## A-16611, Continuing Review Acknowledgement Memorandum (Proposal Log Number 10257006, Award Number W81XWH-11-2-0120) (UNCLASSIFIED)

1 message

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Eaton, Karen M Ms CTR US USA MEDCOM USAMRMC  
<Karen.M.Eaton@us.army.mil>

Mon, Feb 4, 2013 at 4:07  
PM

To: Nansook Park <nspark@umich.edu>

Cc: "Bennett, Jodi H Ms CIV USA MEDCOM USAMRMC" <Jodi.Bennett@us.army.mil>, "Katopol, Kristen R Ms CTR US USA MEDCOM USAMRMC" <Kristen.Katopol@us.army.mil>, "Winter, Sidney T Mr CIV USA MEDCOM USAMRAA" <Sidney.Winter@amedd.army.mil>, "Vu, Bao-Han C Dr DoD Af US USA MEDCOM CDMRP" <bao-han.c.vu.ctr@us.army.mil>, "Brosch, Laura R Dr CIV USA MEDCOM USAMRMC" <Laura.Brosch@us.army.mil>, "Duchesneau, Caryn L Ms CIV USA MEDCOM USAMRMC" <Caryn.Duchesneau@us.army.mil>

Classification: UNCLASSIFIED

Caveats: NONE

SUBJECT: Acknowledgement of the Continuing Review documents for the protocol, "Characterizing Resilience and Growth Among Soldiers: A Trajectory Study - Follow Up," Submitted by Nansook Park, PhD, University of Michigan, Ann Arbor, Michigan, Proposal Log Number 10257006, Award Number W81XWH-11-2-0120, HRPO Log Number A-16611

1. The subject protocol received initial approval by the U.S. Army Medical Research and Materiel Command's (USAMRMC), Office of Research Protections (ORP), Human Research Protection Office (HRPO) on 23 February 2012.
2. The USAMRMC ORP HRPO received the Institutional Review Board (IRB) approval for the continuation of the subject protocol on 25 January 2013. The University of Michigan IRB approved continuation of the protocol on 20 December 2012; this approval will expire on 19 December 2013.
3. This correspondence serves to acknowledge receipt of the continuing review documents for the protocol. No further action related to this continuing review will be taken. The documents in support of this continuing review will be placed in the HRPO file.
4. Please note the following reporting requirements:
  - a. Major modifications to the research protocol and any modifications that could potentially increase risk to subjects must be submitted to the HRPO for approval prior to implementation. Major modifications include a change in Principal Investigator, change or addition of an institution, elimination or alteration of the consent process, change in age range or change in/addition to the study population or a change that could potentially increase risks to subjects.
  - b. All unanticipated problems involving risk to subjects or others must be promptly reported by telephone (301-619-2165), by email ([hrpo@amedd.army.mil](mailto:hrpo@amedd.army.mil)), or by facsimile (301-619-7803) to the HRPO. A complete written report will follow the initial notification. In addition to the methods above, the complete report can be sent to the U.S. Army Medical Research and Materiel Command, ATTN: MCMR-RP, 504 Scott Street, Fort Detrick, Maryland 21702-5012.
  - c. Suspensions, clinical holds (voluntary or involuntary), or terminations of this research by the IRB, the institution, the Sponsor, or regulatory agencies will be promptly reported to the USAMRMC ORP HRPO.

d. Any deviation to the protocol that may have an adverse effect on the safety or rights of the subject or the integrity of the study must be reported to the HRPO as soon as the deviation is identified.

e. A copy of the continuing review approval notification by the University of Michigan IRB must be submitted to the HRPO as soon as possible after receipt of approval. According to our records, it appears the next continuing review by the University of Michigan IRB is due no later than 19 December 2013. Please note that the HRPO also conducts random audits at the time of continuing review and additional information and documentation may be requested at that time.

f. The final study report submitted to the University of Michigan IRB, including a copy of any acknowledgement documentation and any supporting documents, must be submitted to the HRPO as soon as all documents become available.

g. The knowledge of any pending compliance inspection/visit by the Food and Drug Administration (FDA), Office for Human Research Protections, or other government agency concerning this clinical investigation or research; the issuance of Inspection Reports, FDA Form 483, warning letters or actions taken by any Regulatory Agencies including legal or medical actions; and any instances of serious or continuing noncompliance with the regulations or requirements must be reported immediately to the HRPO.

5. Please Note: The USAMRMC ORP HRPO conducts random site visits as part of its responsibility for compliance oversight. Accurate and complete study records must be maintained and made available to representatives of the USAMRMC as a part of their responsibility to protect human subjects in research. Research records must be stored in a confidential manner so as to protect the confidentiality of subject information.

6. Do not construe this correspondence as approval for any contract funding. Only the Contracting Officer or Grants Officer can authorize expenditure of funds. It is recommended that you contact the appropriate contract specialist or contracting officer regarding the expenditure of funds for your project.

7. The HRPO point of contact for this study is Karen M. Eaton, MS, Human Subjects Protection Scientist, at [301-619-9268](tel:301-619-9268)/ [karen.m.eaton@us.army.mil](mailto:karen.m.eaton@us.army.mil).

Regards,  
Karen Eaton

Karen M. Eaton, M.S.  
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Classification: UNCLASSIFIED  
Caveats: NONE

**Abstract**

This is an ongoing longitudinal study of 550+ US Soldiers who completed surveys before, during, and after their deployment to Iraq. A comprehensive set of psychosocial characteristics—healthy and unhealthy—were assessed were potentially-traumatic events. Further data collection is ongoing. The specific purpose of the study is to measure resilience and growth in terms of actual trajectories of functioning over time and to identify factors and assets predicting resilience as well as factors predicting growth. The major findings from preliminary analyses of the first three waves of data showed that immediately post-deployment, Soldiers showed evidence of resilience. Factors predicting relative well-being immediately following deployment included positive affect and optimism; unit cohesion and trust; social and family support; and an orientation to meaning. These factors also predicted reports of growth following deployment, although less robustly.

**Introduction**

- Having our Soldiers be at their very best is essential for successful completion of the various Army missions and for successful lives of Soldiers when they leave the service.
- Forms of psychosocial fitness are as important as physical fitness but have not been systematically measured, monitored, or cultivated.
- Recent repeated deployments to combat zones present unprecedented tests for US Soldiers and their families. While mounting stresses related to deployments can lead to mental health problems, there are many Soldiers able to maintain relatively healthy functioning.
- Only a few studies have examined resilience and potential growth experiences among Soldiers. We know little about the phenomena of resilience and growth among Soldiers. It is critical to understand the factors related to healthy and unhealthy functioning.

**Method**

- This is prospective longitudinal study of 550+ Soldiers in the 4th Infantry Division of the US Army who completed surveys about psychosocial well-being before (Time 1), during (Time 2), and immediately after (Time 3) deployment to Iraq. Further follow up data collection is ongoing.
- A comprehensive set of psychosocial characteristics were assessed. Also assessed were potentially-traumatic events.
- It involves an assessment of both healthy and unhealthy functioning in various life domains using survey and interview methods: psychological fitness (positive affect, optimism); social fitness (unit cohesion and trust, social support); family fitness (family support); and spiritual fitness (orientation to meaning, meaning-making).
- Questionnaires were either created for the current study or derived from existing measures.

**Purpose**

The specific purpose of the study is to measure resilience and growth in terms of actual trajectories of functioning over time and to identify psychological, social and organizational protective factors and assets predicting resilience (relatively rapid return to healthy functioning following adversity) as well as factors predicting growth (improved functioning).

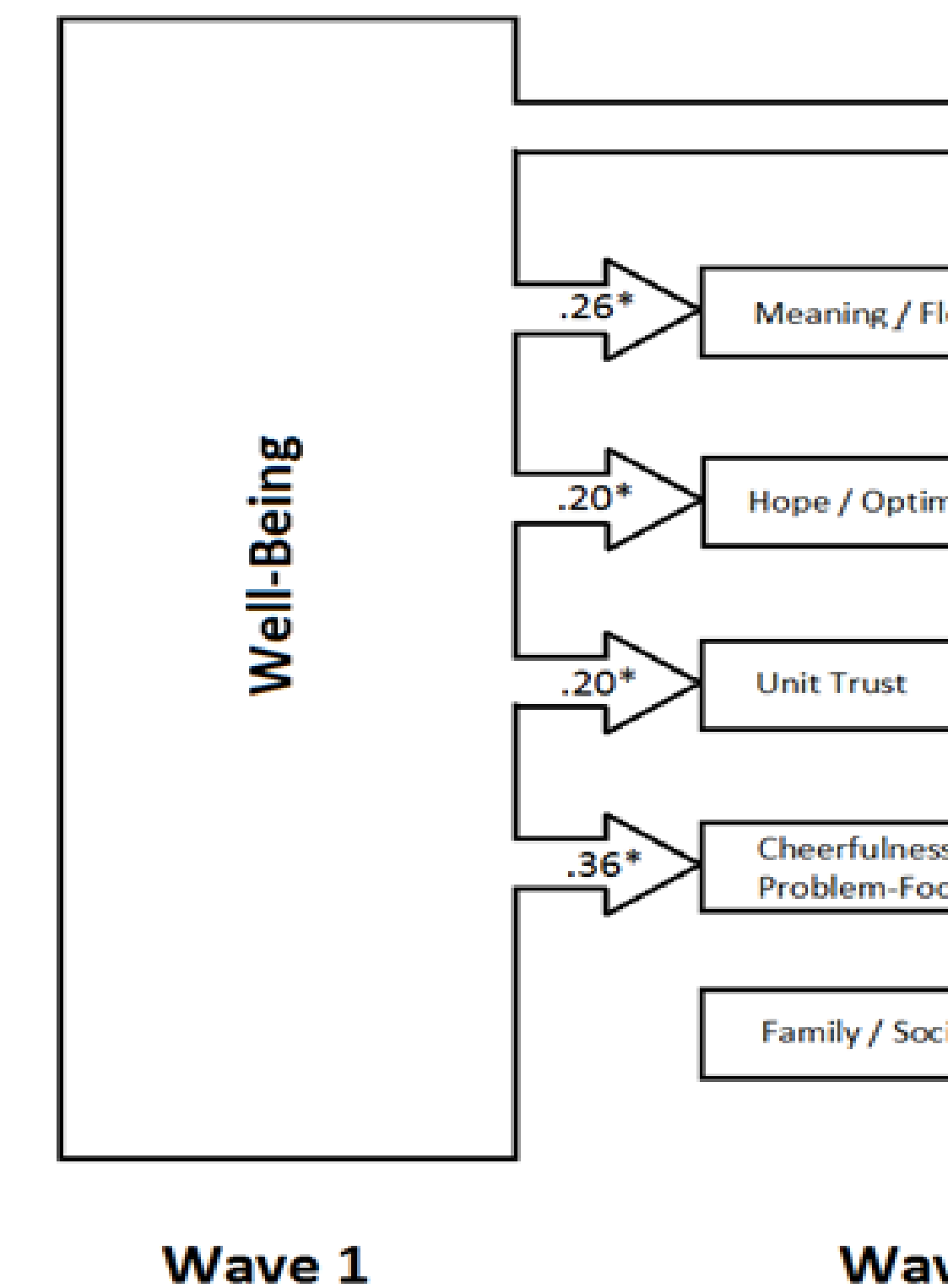


**Preliminary Findings**

Well-Being Across Waves

Measure	Wave 1	Wave 2	Wave 3	Improvement*
Life satisfaction	4.18	4.26	4.39	53%
Depression	16.1	18.9	20.2	27%
PTSD	22.5	22.2	23.6	37%
Positive affect	2.39	1.90	2.40	46%
Negative affect	1.64	1.64	1.77	44%
Growth	53.2	42.6	50.4	46%

\*Percent of sample improved from Wave 1 to Wave 3.



- During deployment, Soldiers frequently experienced adverse events.
- Immediately post-deployment, Soldiers on average had about the same psychological well-being as before deployment, evidence of resilience.
- The factors predicting *relative* well-being immediately following deployment included the Comprehensive Soldier Fitness Program: psychological fitness (e.g., positive affect, optimism); social fitness (unit cohesion and trust); family fitness (e.g., social support, family support); and spiritual fitness (orientation to meaning, meaning-making).
- These same factors also predicted reports of growth following deployment, although less robustly.

**Discussion**

This is one of the first prospective studies to examine resilience and growth simultaneously among Soldiers over several years. It is a longitudinal investigation with data collection using both quantitative and qualitative methods. Preliminary findings suggested the evidence of resilience and growth following deployment and individual differences in adjustments following adversity. Further data collection, including longer term follow-up and qualitative data. Subsequent data will shed light on more evidence of resilience and growth—of deployment to a combat zone. The important benefit of the characterization of resilience and growth is the identification of specific intervention targets for resilience and growth training programs that are conceptually-grounded and empirically-informed.

**Positive Psychology and Physical Health: Research and Applications**

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(revision: April, 2014)

Prepared for *The American Journal of Lifestyle Medicine*

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Running title: Positive Psychology

### Abstract

Positive psychology is the scientific study of a healthy and flourishing life. The goal of positive psychology is to complement and extend the traditional problem-focused psychology that has proliferated in recent decades. Positive psychology is concerned with positive psychological states (e.g., happiness), positive psychological traits (e.g., talents, interests, strengths of character), positive relationships, and positive institutions. We describe evidences of how topics of positive psychology apply to physical health. Research has shown that psychological health assets (e.g., positive emotions, life satisfaction, optimism, life purpose, social support) are prospectively associated with good health measured in a variety of ways. Not yet known is whether positive psychology interventions improve physical health. Future directions for the application of positive psychology to health are discussed. We conclude that the application of positive psychology to health is promising, although much work remains to be done.

Key words: Positive psychology, health psychology, health, well-being, positive interventions

## Positive Psychology and Physical Health: Research and Applications

*Health is a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity.*

—World Health Organization<sup>1</sup>

Most would agree with this statement, but over the years, it has been largely a slogan. More recently, theory, research, and applications from the perspective of positive psychology have helped to articulate the meaning of health and well-being. Positive psychology is an umbrella term for the scientific study of the various contributors to a healthy and thriving life for the self and others (e.g., positive emotions, life meaning, engaging work, and close relationships).<sup>2</sup> It is the study of strengths, assets, and positive attributes. The topics of concern to positive psychology are broad indicators of psychological, social, and societal well-being.

Research has shown that not only are physical, mental and social well-beings important components for complete health, but they are also interconnected. Evidence is accumulating that a happy, engaged, and fulfilling psychological and social life is not just a consequence of good health, it is what leads people to live a healthy and long life.

This paper provides a brief overview of what positive psychology is and addresses how theories, findings, and especially applications from positive psychology might pertain to physical health.

### 1. What is positive psychology?

*Positive psychology* is a perspective within psychology that studies optimal experience, people being and doing their best<sup>2-4</sup>. It challenges the assumptions of the disease model. Positive

psychology assumes that life entails more than avoiding or undoing problems and that explanations of the good life must do more than reverse accounts of problems. Someone without symptoms or disorders may or may not be living well. Positive psychology urges attention to what is taking place on the other side of the zero point of being problem-free. It calls for as much focus on strength as on weakness, as much interest in building the best things in life as in repairing the worst, and as much attention to fulfilling the lives of healthy people as to healing the wounds of the distressed. Research findings from positive psychology are intended to contribute to a more complete and balanced scientific understanding of human experiences and ways to foster thriving in individuals, communities, and societies.

One of the triggers for the introduction of positive psychology was the realization that since World War II, psychology as a field had devoted much of its effort to identifying, treating, and—occasionally—preventing problems like anxiety and depression.<sup>3</sup> The yield of these problem-focused efforts has been impressive, but a myopic view of the human condition has resulted. It is as if psychology has viewed people as only fragile and flawed.

The goal of positive psychology is to complement and extend the problem-focused psychology, and an important idea from positive psychology is that one way to solve problems is by identifying and leveraging individual and societal strengths and assets.<sup>5</sup>

The topics of concern to positive psychology can be divided into four related topics:<sup>2,3</sup>

- the field positive subjective experiences (happiness, gratification, fulfillment, flow)
- positive individual traits (strengths of character, talents, interests, values)
- positive interpersonal relationships (friendship, marriage, collegueship)
- positive institutions (families, schools, businesses, communities)

The value of positive psychology is to use the scientific method to sort through various claims and hypotheses about what it means to live well or poorly and to identify the relevant circumstances in each case.

## 2. Positive psychology and health

Can physical health be clarified by a positive perspective in the same way that psychological well-being has been clarified? To return to the definition of health by the World Health Organization with which this article began,<sup>1</sup> a positive perspective urges us to look beyond the mere absence of disease and infirmity to define what it means to be healthy in positive terms.<sup>6-8</sup> *Positive health* can be characterized not only as a long and disease-free life but additionally in terms of:

- less frequent and briefer ailments
- greater recuperative ability
- rapid wound healing
- more physiological reserves
- chronic but non-debilitating diseases

Familiar within the field of epidemiology are the population-level concepts of DALYs (disability adjusted life years), HALYs (health-adjusted life years), and QALYs (quality-adjusted life years), which combine measures of morbidity and mortality into the same index.<sup>9</sup> Along these lines, HLEs (happiness-adjusted life expectancies) measure the quality of life in a nation by forming the product of the average life expectancy and the average happiness (aka subjective well-being, life satisfaction) in that nation.<sup>10</sup> Positive health concerns itself with the individual-level analogues of these constructs.

The field of positive health as we envision it overlaps with allied approaches concerned with *disease prevention*, *health promotion*, and *wellness*. The value of positive health as an approach in its own right is that it makes explicit the need to consider good health as opposed to the absence of poor health. Studies of “wellness” often end up being studies of illness, much as studies of mental “health” are often studies of mental illness.

Concern with positive health leads to an examination of *health assets*, individual-level factors that produce positive health in one or more of the ways that it might be defined, over-and-above the frequently-studied risk factors for poor health, like high cholesterol, obesity, smoking, excessive alcohol use, and a sedentary lifestyle.<sup>8</sup> Among the psychosocial risk factors frequently examined with respect to poor health are anger, anxiety, depression, and social isolation. By the logic of a positive perspective, the mere absence of these negative states and traits is not all that matters for physical health. Important as well are positive states and traits, and the contribution of these in their own right needs to be studied, controlling for negative states and traits as well as other usual-suspect risk factors.

There have been extensive studies on negative psychological factors such as stress, depression, hostility and their effects on increased risk of various health problems.<sup>11</sup> However, less known is whether certain positive psychological factors play a protective role against health risks. Research has shown that positive and negative emotions are not opposite and are only modestly correlated.<sup>12,13</sup> Experiencing each of those emotions is also involved in the activation of different brain regions.<sup>14</sup>

For the past several years, researchers have examined the contributions of health assets, especially psychological ones, to good health, while they have controlled for established risk factors. Researchers need to examine both risk factors and health assets to understand

relationships between both positive and negative psychological factors as they together contribute to health outcomes.

Carefully-conducted research shows that positive health assets indeed predict good health assessed in a variety of ways.<sup>15</sup> Among the positive psychology health assets foreshadowing good health are:

- positive emotions<sup>16,17</sup>
- life satisfaction<sup>17,18</sup>
- optimism<sup>19-22</sup>
- forgiveness<sup>23</sup>
- self-regulation<sup>24</sup>
- vitality and zest<sup>25</sup>
- life meaning and purpose<sup>26-29</sup>
- Helping others and volunteering<sup>30-32</sup>
- good social relationships<sup>33-35</sup>
- spirituality and religiosity<sup>36,37</sup>

There has been growing evidence that positive psychological characteristics affect health and longevity using various research methods including longitudinal prospective and experimental designs.

Perhaps, among the most well-known long-term studies that showed the possible link between positive psychological assets and health outcomes is The Nun Study.<sup>38</sup> A group of American nuns who were members of the School Sisters of Notre Dame wrote autobiographical essays in their early 20's when they joined the Sisterhood. Six decades later, researchers who had accessed the convent archive scored the emotional content of 180 essays in terms of positivity,

and investigated whether they were related to the mortality of nuns. Indeed, positive emotional content was significantly related to longevity. The nuns who expressed more positive emotions ( those in the upper 25%) in their essays, strikingly, lived on average 10 years longer than those expressing fewer positive emotions ( those in the bottom 25%). In other words, happier nuns lived longer than less happy (but not depressed) nuns. Putting this in context, unhealthy behavior like smoking costs on average 7 years of one's life.<sup>2</sup>

In another experimental study, Cohen and his colleagues examined the relationships between positive emotions and the vulnerability of catching the common cold.<sup>39</sup> With 334 healthy adult volunteers in the community, they first measured both positive emotional experience such as happy, pleased, lively and relaxed, and negative emotional experiences such as depressed, anxious, and hostile over a few weeks using self-reports. Afterward, participants were invited to the study lab and exposed to rhinoviruses through nasal drops and monitored in quarantine for the development of the common cold. The researchers found that higher positive emotional experiences were related to lower risk of developing a cold and fewer reports of symptoms, while negative emotional experiences were not significantly related to catching a cold, but associated with reports of more symptoms. In short, this study showed that experiencing positive emotions was linked to greater resistance to developing the common cold.

The health benefits of positive psychological assets have been documented in different cultural settings as well. For instance, in Japanese culture, the most commonly used indicator of subjective well-being is the sense of "life worth living (*ikigai*)".<sup>29</sup> In a population-based prospective cohort study with 43,391 adults in Ohsaki, Japan, lack of the sense of "life worth living (*ikigai*)" was significantly associated with higher risk of all-cause mortality over time. Those who reported having an *ikigai* in their life in a survey were more likely to be alive at a 7

year follow-up compared to their counterparts who did not find a sense of *ikigai*. Interestingly, the increase in mortality risk was due to an increase in mortality from cardiovascular disease and external causes such as suicide, but not to mortality from cancer. Having a sense of “life worth living (*ikigai*)” often means having a purpose in life and realizing the value of being alive which could serve as a motivation for living.

In our own study with US adults, having life purpose played a protective role for heart health.<sup>27</sup> At a 2 year follow-up, the higher level of life purpose was prospectively related to lower risks of incidence of myocardial infarction among people with coronary heart disease at the baseline.

One of the ways to achieve a sense of life meaning and purpose is through helping others and doing regular volunteer works in communities. Research has shown that among elders, people who volunteer regularly are healthier and live longer.<sup>30,31</sup> In a longitudinal study with a nationally representative sample of community-dwelling older US adults, a study found that volunteerism predicted a lower risk of hypertension 4 years later.<sup>31</sup> That is, those who had volunteered at least 200 hours in the previous 12 months were less likely to develop hypertension risk compared to those who did not volunteer. However, lower levels of volunteer did not decrease health risk of hypertension. It seems that dosage and intentions of volunteer matters for its’ health benefits. In another study, people who regularly volunteered for self-oriented motives did not exhibit lower risk for mortality 4 years later, while those who regularly and frequently volunteered for other-oriented motives showed lower risk of subsequent mortality.<sup>32</sup> In conclusion, it is good to be good!

One of the well-studied health-related positive psychology topics is optimism. Optimism is sometimes seen as pollyannaism, a naively rosy view of the world coupled with a ‘don’t worry,

be happy' attitude. However, optimism the way researchers study is a disposition to an expectation that the future will entail more positive events than negative ones.<sup>40</sup> Optimists are neither in denial nor naive about challenges and difficulties in life. They simply attend to and acknowledge the positive.

Empirical research shows that optimism – usually assessed with self-report surveys – relates to good health and a long life. According to research, among asymptomatic men with HIV, optimism slowed the onset of AIDS over an 18-month follow-up.<sup>41-42</sup> Over an 8-year follow-up, optimism predicted better pulmonary function among older men, even when smoking was controlled.<sup>43</sup> In a longitudinal study of older men and women, optimism predicted not only better health, but also lower levels of pain.<sup>44</sup> Our own research group recently reported a study of a large nationally representative sample of older adults (aged > 50 years) in the US showing that over a 2-year period, optimism predicted a lower likelihood of stroke, even after controlling for chronic illnesses, self-rated health and relevant socio-demographic, biological and psychological factors.<sup>45</sup>

In addition, the importance of social support and positive relationships on good health and well-being has long been documented. Supportive social relationships were associated with longevity, less cognitive decline with aging, greater resistance to infectious disease, and better managements of chronic illnesses.<sup>33-35</sup>

Enough well-designed studies exist in support of the premise that health assets predict good health to warrant further investigation. Research so far provides compelling evidence that positive psychological health assets predict or are associated with various health outcomes and longevity among healthy populations. However, what is relatively unknown are the effects of

positive health assets for recovery and long-term health outcomes among those with serious health problems such as cancer.

Furthermore, before we consider interventions that deliberately encourage these assets in order to reduce morbidity and mortality and to increase physical well-being, there are issues that need to be addressed.<sup>46</sup>

First, assuming that health assets do play a causal role, what are the mechanisms? Research to date has often been stark, usually demonstrating an association over time but not clarifying how it happens. We assume the pathways are multiple, from biological to emotional to cognitive to behavioral to social. For example, in the case of optimism, biologically, it has been linked to better immune system functioning, and behaviorally, people who are optimistic engage in healthier behaviors. They eat healthy, exercise, do not smoke or drink, and seek medical care when they need. Socially, optimists have better and more frequent social contacts. All of these are associated with health benefits.

It is unknown which pathway bears the most traffic or whether the mechanisms vary as a function of the specific health outcome (e.g., cardiovascular disease versus the common cold) or as a function of the individual's age, gender, or lifestyle. Again, the best a researcher can do is to identify plausible mechanisms in a given study and explicitly investigate their role as mediators.

Second, are health assets a cause of good health or merely a correlated marker of its real causes? Indeed, the array of positive health assets is challenging for researchers, who cannot study or control all possible assets in the same investigation. No single study relying on correlational data can be definitive, so it is the overall body of research investigating health assets that must be examined to draw causal conclusions.<sup>17</sup>

Third, do the apparent benefits of health assets generalize to all kinds of health outcomes? Much of the relevant research has ascertained general health and all-cause mortality, and some of this work has relied only on self-reported information about health status. When researchers look at specific health outcomes assessed in more objective ways, psychological health assets seem to be more predictive of cardiovascular health than they are of freedom from cancer. So, the benefits of health assets may be disease specific. A wider variety of diseases needs to be investigated from the positive health perspective. Moreover, research is not clear about the relative contribution of health assets to disease onset, to disease progression, and/or to recovery.

### **3. Positive psychology interventions for physical health**

Researchers and practitioners have begun to develop intervention strategies based on positive psychology to increase positive psychological assets such as positive emotions or life satisfaction to bolster physical health. Whether increasing positive psychological assets will turn to better health outcomes is inconclusive. These intervention efforts targeting health assets in order to lead to better health not only have practical significance but also theoretical importance because appropriately done intervention studies would strengthen the claim that health assets actually cause good health.

We refer to interventions informed by positive psychology as positive psychology interventions. Sometimes positive psychology interventions entail a specific technique, like counting one's blessings at the end of the day or using one's signature strengths of character in novel ways.<sup>47</sup> At other times, the intervention uses a more-elaborated therapy package that combines different techniques, such as *Well-Being Therapy*,<sup>48</sup> and *Quality of Life Therapy*,<sup>49</sup> among others.

Intervention studies allow us to conclude that interventions informed by positive psychology can indeed change positive psychological states and traits, sometimes in lasting ways.<sup>47,48</sup> An important qualification is that long-term benefits do not result from one-shot interventions unless these lead to a change in how someone habitually lives.<sup>18</sup> Perhaps, what is required is a sustained lifestyle change.

On the face of it, intervening to increase a health asset should also have benefits for physical health, given the association between health assets and health outcomes. However, this argument does not embody a syllogism. Health assets may not be direct causes of good health, and even if they are, changing them may not result in better health. Said another way, we do not yet know if the health benefits of deliberately-cultivated happiness or optimism or life meaning have the same benefits as their naturally-occurring counterparts.

Needed is intervention research that includes physical health as an explicitly-measured outcome. While it is interesting and important to show that a positive psychology intervention increases the psychological well-being of medical patients, the more exciting issue is whether the intervention also affects their physical health. If so, how quickly would health benefits be evident? And what is the mechanism by which the intervention has an effect?

In studying the mechanisms by which a positive psychology intervention influences physical health, the role played by mundane behavior should not be neglected<sup>46</sup>. There are well-documented “healthy” ways of behaving,<sup>51</sup> including: sleeping eight hours a night, eating balanced meals, not smoking, not drinking to excess, and exercising regularly.

We suspect that positive psychology interventions, when successful, lead people not only to think and feel in more positive ways, but also to behave in more healthy ways.<sup>40, 46</sup> For example, optimistic people are more actively engaged with the world and are better problem

solvers than their pessimistic counterparts. They have more frequent and higher quality social contacts as well as more social support. All of these factors may lead to healthier behaviors and habits and eventually to better health.

Positive psychology intervention studies for better health outcomes are in their infancy. So far, nearly all positive psychology interventions primarily targeted changing health related behaviors such as physical activity, not the health outcome directly. Researchers have shown that positive psychology interventions influence some of the biological and behavioral processes implicated in good health. For example, inducing positive emotions speeds cardiovascular recovery following a stressful event.<sup>52</sup> Training in mindfulness meditation can boost immune function.<sup>53</sup> Psychosocial resilience training targeting positive emotions, cognitive flexibility, social support, life meaning, and active coping reduces total cholesterol among middle-aged adults.<sup>54</sup> Researchers have begun to investigate how positive affect and affirmation influence physical activity and medication adherence among patients with coronary artery disease,<sup>55</sup> asthma,<sup>56</sup> and hypertension.<sup>57</sup> The next step in each case is to show that such interventions also increase good health as opposed to its possible precursors.

Using a randomized controlled clinical trial, a group of researchers recently developed an intervention strategy that enhances positive affect and self-affirmation (PA/SA) and applied it to three different high-risk clinical populations (e.g., hypertension, asthma, coronary artery disease) to change their health related behaviors.<sup>55-57</sup>

In each clinical trial, patients were randomly assigned to either the patient education (PE) control group or the positive-affect/self-affirmation (PA/SA) intervention group. For the control group, each patient received an educational workbook, a pedometer, and a behavior contract for a physical activity goal. For the intervention group, each received PE control components and

additionally, a PA/SA workbook chapter, bimonthly induction of PA/SA by telephone, and small mailed gifts. Patients in the PA intervention group were taught how to self-induce positive affect and self-affirmation using a workbook chapter, received bimonthly inducement of PA/SA by telephone, and unexpected small gifts (PA) mailed bimonthly several weeks before follow-up calls. During PA/SA induction phone calls, patients were told to “think about things that make you feel good” and take a moment each day to enjoy positive thoughts (PA), and to think about “proud moments” in their personal lives if they have a difficult time exercising (SA). For both groups, data was collected through a standardized bimonthly telephone follow-up for 12 months.

Using this research design, researchers conducted three parallel studies. In study 1,<sup>55</sup> patients were recruited right after percutaneous coronary intervention to increase physical activity among people with coronary artery disease. Compared to the control group, patients in the intervention group engaged in significantly more physical activities. In study 2,<sup>56</sup> physical activity among asthma patients who participated in the study was improved without differences between control and intervention groups. There was no significant effectiveness of intervention. In study 3,<sup>57</sup> the intervention effect on enhancing medication adherence among hypertensive African Americans was examined. Patients in both control and intervention groups received a culturally appropriate hypertension self-management workbook, a behavioral contract, and bimonthly telephone calls to help them better handle barriers to medication adherence. In addition, patients in the PA/SA intervention group received small gifts and bimonthly telephone calls to help them utilize positive thoughts into their daily routine and foster self-affirmation. At the 12 month follow-up, the intervention group showed a significantly higher level of medication adherence compared to the control group (42% vs. 36%). The reduction of blood pressure was found among participants without significant differences across groups.

Mixed results from these intervention studies leave questions that need to be clarified with more studies to better understand the effectiveness of a positive psychology intervention on the different health outcomes before they are implemented in health practices.

Another line of positive psychology intervention research that attracted significant attention in recent years is applications of mindfulness meditation. It is assumed that meditations induce positive affect and lead to good health. A study led by a neuroscientist, Richard Davidson, demonstrated that mindfulness meditation produces changes in brain and immune function in a positive way.<sup>53</sup> In this study, twenty-five healthy employees at a work site received an 8-week intensive clinical training in mindfulness meditation. A weekly training class met for about 3 hours and a silent 7 hour retreat was held during week 6 of the training. In addition, participants were instructed to perform home meditation practices for 1 hour each day, 6 days a week with the guided audiotapes. Brain electrical activity was measured at the baseline, the end of training, and 4 months after training. Also at the end of training, participants were vaccinated with influenza vaccine. Results from the meditation group were compared to those of the wait-list control group. Among the meditation group, brain activity in the left-sided anterior associated with positive affect, was significantly increased. They also found significant increases in antibody concentrations to influenza vaccine in the meditation group. Interestingly, the size of increase in left-sided activation predicted the size of antibody concentration rise to the vaccine.

In sum, the effects of positive psychology interventions on health outcomes are inconclusive. As stated before, positive psychology interventions seem to be more effective on reducing health risks among healthy individuals in the short-term. However, its long-term health effects, especially, on a population with different health problems, is not clear.

#### 4. Conclusions

Positive psychology is a perspective that urges scientific attention to strengths and assets that contribute to health and a flourishing life. We have described what positive psychologists have learned about the relationships between positive psychological assets and physical health in the past decade.

To date, the application of positive psychology to health is promising, although much work remains to be done. On the positive side, research shows that what we call positive psychological health assets (e.g., positive emotions, life satisfaction, optimism, positive relationships, life purpose) are prospectively associated with good health measured in a variety of ways. Also on the positive side, interventions have been developed that increase these assets; lasting effects require a lifestyle change.

Not yet known is whether positive psychology interventions improve physical health, reducing morbidity and mortality, speeding recovery from illness, and so on. Investigators are beginning to study the health effects of such interventions. Studies to date suggest that positive psychology interventions reduce some of the biological and behavioral processes that impact health, but the next step is to study good health per se.

We urge an open mind about the eventual success of such interventions. It is important not to get too far ahead of the data. Perhaps these interventions will work as intended, perhaps not. For example, the lesson from studies of psychological interventions targeting negative states and traits such as anger and depression in the hope of reducing cardiovascular disease, with which they are associated, is instructive. The success of these interventions is checkered at best.<sup>46</sup> Whether the deliberate cultivation of positive health assets such as positive emotions or

life purpose will be more successful in promoting good health than the reduction of psychological risk factors is not known, but is a question worth addressing.

In conclusion, growing evidence suggests that positive psychological assets are linked to health and longevity. However, more studies are necessary to learn more about when, why, how and for whom positive psychological assets plays a role in good health and whether interventions that enhance these assets will yield health benefits. We urge a skeptical yet fair-minded attitude on the part of researchers and practitioners and that they pay particular attention to underlying mechanisms. Meanwhile, freedom from disease and longevity are not the only goals of life. Quality of life matters in addition to quantity of life. It is clear from research that experiencing frequent positive emotions, having sense of life purpose, paying attention to what is positive in life, and living a more socially integrated life is linked to one's quality of life across the lifespan. Thus, helping people cultivate positive psychological and social assets in life has potential for leading to happier, more meaningful and healthier lives.

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