Harmonizing Resilience Research at NIH

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Disclosure Information

The author of this presentation has no financial interests or relationships to disclose.

Mention of trade names, commercial products, or organizations does not imply endorsement.
A Call to Operationalize the Definition of Resilience in 1993

Before the construct of resilience can truly reap the rich promise that it holds for promoting our knowledge of development and psychopathology, however, a number of caveats must be articulated. It is our hope that the articles contained in this Special Issue will serve as an impetus to fostering theoretical and research gains. Currently, the popularity of resilience as a construct has exceeded the research output associated with it. As such, resilience is at risk for being viewed as a popularized trend that has not been verified through research and, thereby, in danger of losing credibility within the scientific community. To prevent this, it is imperative that theorists in the area of resilience devote equal effort to advancing the construct empirically.

Toward this goal, a number of issues must be addressed. Perhaps first and foremost, researchers must clearly operationalize their definition of resilience. At present, various researchers employ different definitions of resilience that can range from the absence of psychopathology in the child of a mentally ill parent to the recovery of function in a brain-injured patient. Definitional diversity results in sometimes disparate profiles of competent adaptation as well as in different estimates of rates of resilience among similar risk groups. Depending on how broad or conservative the definition of resilience is, vastly different conclusions can be drawn. While it may still be premature to agree on the definition of resilience, this may well be a future goal of investigators. In the interim, specifics on the operationalization of resilience need to be included in all research reports.
Objectives:
Develop a consensus on a trans-NIH definition of resilience, facilitate ICO collaborations, and identify research tools, programs, and mechanisms to further the development of a trans-NIH resilience research agenda.
Suggested Criteria

An NIH-wide definition of resilience should be broad enough to encompass all health/disease outcomes, a range of stressors, and challenges due to normal physiologic processes such as aging.

The definition should ensure applicability at the population level, individual biological level, and psychological level, and

An NIH-wide definition of resilience should align with the overall mission of the NIH.
Defining Resilience at NIH

Resilience can be defined as a system’s capacity to resist, recover, recover better (grow), or adapt in response to a challenge or stressor.
Defining and Conceptualizing Resilience at NIH

- At NIH, resilience can be defined as a system’s capacity to resist, recover, recover better (grow), or adapt in response to a challenge or stressor.
  - A system can represent various domains (e.g., individual, community), levels (e.g., social, behavioral, physiological), and/or processes (e.g., aging).
  - Over time, a system’s response to a challenge might show varied degrees of reactions that likely fluctuate in response to the severity of the challenge, the length of time exposed to the challenge, and/or innate/intrinsic factors.
Does the research design include a stressor or a proxy for a stressor or challenge?  

Are the metrics designed to capture changes that strengthen and empower the system towards resistance, recovery, growth, or adaptive response?  

Is an intervention identified? OR Are protective factors identified or sought for discovery?  

Are the metrics designed to capture changes that strengthen and empower the system towards resistance, recovery, growth, or adaptive response?  

Is the study designed to identify interventions or protective factors that directly strengthen and empower the system?  

RESILIENCE STUDY
<table>
<thead>
<tr>
<th>Title</th>
<th>Challenge/Stressor</th>
<th>Outcomes</th>
<th>Supplement/Dietary ingredient</th>
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</thead>
<tbody>
<tr>
<td>Preservation of Psychological Resilience Under Chronic Stress</td>
<td>sleep deprivation, social defeat</td>
<td>Adaptive response&lt;br&gt;Inflammatory signaling, CNS plasticity</td>
<td>resveratrol, polyphenol, grape juice</td>
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<td>Perinatal stroke: effects of bioactive lipids on immune-neurovascular axis and brain repair</td>
<td>perinatal stroke, acute bacterial infection</td>
<td>Recovery&lt;br&gt;Attenuated signaling at immune-neurovascular axis (neuroinflammation, vascular inflammation)</td>
<td>Omega-3-fatty acids</td>
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<td>Botanicals enhancing neurological and functional resilience in aging</td>
<td>Aging</td>
<td>Resist&lt;br&gt;Neuronal activity, oxidative stress, mitochondrial function</td>
<td>botanicals (Centella asiatica and Withania somnifera), triterpenes and caffeoyl quinic acids</td>
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<tr>
<td>Influence of Dietary Botanical Supplements on Biological and Behavioral Resilience</td>
<td>stress induced models of depression/psychological impairment</td>
<td>Resist/adaptive response&lt;br&gt;Upregulation of II-6 in response to Trier Social Stress Test</td>
<td>polyphenol</td>
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<tr>
<td>Spirulina oral supplement for enhancing host resilience to virus infection</td>
<td>respiratory viral infections</td>
<td>Resist</td>
<td>Spirulina (Braun-ty lipoproteins)</td>
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OFFICE OF DIETARY SUPPLEMENTS 2018-2020: EXAMPLES OF RESILIENCE RESEARCH
APPLICATION OF THE RESILIENCE RESEARCH DESIGN TOOL
Application of the Resilience Research Design Tool (Example 1)

- Are one or more key research terms identified in the title, abstract, or specific aims?
- Does the study target health maintenance, ability to thrive, or preventative or protective pathways?
- Does the research design include a stressor or a proxy for a stressor or challenge?
- Is an intervention identified? OR Are protective factors identified or sought for discovery?
- Are the metrics designed to capture changes that strengthen and empower the system towards resistance, recovery, growth, or adaptive response?
- Is the study designed to identify interventions or protective factors that directly strengthen and empower the system?

**Mechanisms and active compounds in the Botanical Water Extract (BWE)**

**Keyword terms: enhance, reverse**

In our preliminary studies, BWE reversed learning deficits in aged Tg2576 mice, a model of Alzheimer’s disease (AD) with high beta amyloid (Aβ) plaque burden, without altering brain Aβ levels. This suggests that BWE can attenuate Aβ neurotoxicity, without altering its formation or deposition.

Using both targeted and unbiased approaches, we will explore BWE’s protective effects against mechanisms of Aβ toxicity.

The mechanisms to be explored in this study are relevant to age-related decline in neuronal health and cognition in general and are not limited to those associated with Aβ toxicity.

We hypothesize that Aβ-modulating effects of BWE are mediated by nontriterpene, phenolic compounds working by one or more mechanisms relevant to neuronal health.
<table>
<thead>
<tr>
<th>Opportunities</th>
<th>Gaps</th>
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<tbody>
<tr>
<td>• Define Resilience</td>
<td>• Characterizing magnitude of (natural) stressors</td>
</tr>
<tr>
<td>• Characterize the resilience outcomes explored (resist, recover, recover better, adapt, etc.)</td>
<td>• Characterizing magnitude of intrinsic protective factors</td>
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<tr>
<td>• Attention to resilience checklist to help harmonize the science</td>
<td>• Duration/ life cycle of:</td>
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<tr>
<td></td>
<td>• stressors</td>
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<tr>
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<td>• Interventions</td>
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<td>• protective factors</td>
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<td>• resilience outcomes</td>
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<td>• Measures/ metrics domain specific?</td>
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