From mental depletion to spontaneous replenishment:
A regulatory stimulant hypothesis

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Self-Regulation

Practical and Theoretical Import

• When, how, and why we engage in self control (e.g., Baumeister, Bratslavsky, Muraven, & Tice, 1998; Carver & Scheier, 1981; Loewenstein, 1996; Metcalfe & Mischel, 1999; Trope & Fishbach, 2000)

Depletion Model

• Over a decade of dominance
• Typifies self-control as a limited resource (see Baumeister, Vohs, & Tice, 2007)

Processes underlying resource depletion

• *Physiological Factors*
  • Working Memory Capacity (Schmeichel, 2007)
  • Glucose (see Gailliot & Baumeister, 2007)

• *Psychological Factors*
  • Motivation (Molden et al., in press; Muraven et al., 2006)
  • Lay Beliefs about Willpower (Job, Dweck, & Walton, 2010)
  • Perceptions of Mental Fatigue (Clarkson et al., 2010; 2011)
Process of replenishment

- Physiological Sources (e.g., Rest, Glucose) → Gradual Restoration
- Psychological Sources (e.g., Mood, Affirmation) → Spontaneous Restoration

Current Research

- Provide a conceptual framework to understand the restorative effects of psychological sources of restoration
- Understanding the processes leading to spontaneous resource restoration informs our understanding of replenishment more broadly
A Regulatory Stimulant Hypothesis

Psychological Sources of Replenishment

- Positive Mood (Tice et al., 2007)
- Self-Affirmation (Schmeichel & Vohs, 2009)
- Power (DeWall et al., 2011)

Multiple mechanisms underlying SRR:

- Positive Mood $\rightarrow$ arousal
- Self-Affirmation $\rightarrow$ task construal
- Power $\rightarrow$ effort

Spontaneous Resource Replenishment [SRR]

A common process?
A Regulatory Stimulant Hypothesis

Importance of *perceived* mental fatigue (Clarkson et al., 2010; Job et al., 2010)

- Clarkson and colleagues (2010) found that self-regulatory success is dependent on perceived—as opposed to actual—levels of mental fatigue
Perceptions can alter executive functioning (Clarkson et al., 2011)

- Clarkson and colleagues (2011) found that perceptions of mental fatigue alter working memory capacity and thus the availability of regulatory resources.
- Independent of actual mental fatigue.
A Regulatory Stimulant Hypothesis

What makes a regulatory stimulant?

• People form expectations of restorative power of various sources
  • e.g., Energy supplements, # of hours slept, watch funny movies, socialize with friends, check Facebook, sneak a catnap
• Idiosyncrasies aside, people share common expectancies—especially concerning ubiquitous experiences (Clore & Ortony, 1991; Rimé, Philippot, & Cisamolo, 1990)
• A positive expectancy, then, should invoke SRR
Overview

Goal: Better understand regulatory restoration

• Particular interest in understanding the phenomenon of spontaneous regulatory restoration [SRR]

A regulatory stimulant hypothesis

• Sources of SRR activate a global expectancy of recovery
  • Alters perceptions of mental fatigue
  • Impacts the availability of working memory capacity
• A positive expectancy can generate immediate regulatory recovery

Two experiments to support this hypothesis

• Indirect (Exp 1) and direct (Exp 2) activation of expectancies
• Test each step of the hypothesis
Positive Mood as a Regulatory Stimulant

Experiment 1
Experiment 1a: Overview

Is positive mood implicitly associated with a restorative expectancy?

- We share prototypes about ‘typical consequences’ of mood (Clore & Ortony, 1991; Rimé, Philippot, & Cisamolo, 1990; Shaver, Schwartz, Kirson, & O’Connor, 1987)
- Positive emotions (e.g., joy) are associated with increased energy (Shaver et al., 1987)
- Does this extend to the more diffuse experience of positive mood?
Experiment 1a: Procedure

$N = 68$

Restorative expectancies: Positive or Negative Mood

- 7-item questionnaire:
  - **Positive** mood gives me more energy than normal
  - **Positive** mood makes me less tired than normal
Experiment 1a: Results

**Restorative Expectancy**

- **Positive Mood**: 
  - Mean: 8
  - Statistical significance: $t(67) = 13.94, p < .001$

- **Negative Mood**: 
  - Mean: 3

Comparison illustrates a significant difference with positive mood showing higher restorative expectancy compared to negative mood.
Experiment 1b: Overview

Is positive mood a regulatory stimulant?

- Manipulate mood state
- Assess impact on perceived mental fatigue and working memory

Control for PAEs:

- Arousal hypothesis (Thayer, 1989; Tice et al., 2007)
- Motivation hypothesis (Muraven & Slessareva, 2003; Muraven et al., 2006)
Procedure

$N = 166$

Depletion Task [Thought Suppression]

Manipulate Mood: Positive or Negative (Bless et al., 1996; Schwarz & Clore, 1983)

- Perceived Mental Fatigue (MFI: Smets et al., 1995)
- Current Mood State: Valance and Arousal (BMIS: Mayer & Gaschke, 1988)
- Motivation (Muraven & Slessareva, 2003)
- Working Memory Capacity (OSPAR: Turner & Engle, 1989)

**NOTE:** Depleted and Non-depleted Controls
Preliminary Analyses

Mood:
• Valance \( t(81) = 4.28, p < 0.001 \)
• Arousal \( t(81) = 3.68, p < 0.001 \)

Motivation:
• Exert energy \( t < 1 \)
• Resource conservation \( t < 1 \)
Main Analyses

Perceived Mental Fatigue

Scale Range: 1 - 5

- Positive Mood
- Negative Mood
- Non-Depleted Control
- Depleted Control
Main Analyses

Working Memory Capacity

Scale Range: 0 - 36

- Positive Mood
- Negative Mood
- Non-Depleted Control
- DePLETED Control
Mediation Analyses

Mood \rightarrow \text{Perceived Mental Fatigue} \rightarrow \text{Working Memory}

.26^* \rightarrow -.15 (-.21^*) \rightarrow -.23^* (-.28^*)

[controlling for arousal]

95% CI (.11 to 2.03)
Experiment 1: Discussion

Positive mood invokes a restorative expectancy
  • Evidence that expectancies can be pre-existing

Positive mood acts as a regulatory stimulant
  • Positive mood led to spontaneous recovery (in the form of WMC)
  • Recovery driven by perceived mental fatigue
  • Occurred:
    • Absent any differences in motivation
    • Above and beyond any differences in arousal
The Importance of Expectancies

Experiment 2
Experiment 2: Overview

Isolate the impact of restorative expectancies

- Vary pre-existing expectancies of mood
- Expectancies are malleable to situational cues (Job et al., 2010; Nussbaum & Dweck, 2008)

Control for PAEs

- Construal Hypothesis (Fujita, Liberman, Trope, & Levin-Sagi, 2006; Schmeichel & Vohs, 2009)

Test entirety of regulatory stimulant hypothesis

- Behavioral index of SRR after working memory task
Procedure

\[ N = 150 \]

Depletion Task ['e-task']

Manipulate Mood: Positive or Negative (Bless et al., 1996; Schwarz & Clore, 1983)

Manipulate Expectancy: Positive/Negative Mood is restorative

- Perceived Mental Fatigue (MFI: Smets et al., 1995)
- Current Mood State
- Motivation
- Construal of subsequent tasks (Behavioral Identification Form: Vallacher & Wegner, 1989)
- Working Memory Capacity (OSPAN: Turner & Engle, 1989)
- Anagram Task (Clarkson et al., 2010; Muraven et al., 2006; Vohs et al., 2008)
Preliminary Analyses

Mood ($F(1,96) = 18.22, p = .001$)

Motivation
- WMC Task ($ps > .26$)
- Anagram Task ($ps > .37$)

Construal ($ps > .17$)
Main Analyses

Perceived Mental Fatigue

Scale Range: 1 - 9

Positive Mood is Restorative  Negative Mood is Restorative
Main Analyses

Working Memory Capacity

- Positive Mood is Restorative
- Negative Mood is Restorative

Scale Range: 0 - 36
Main Analyses

Anagram Performance

Positive Mood is Restorative  Negative Mood is Restorative

Positive Mood

Negative Mood
Main Analyses

Anagram Performance

- Positive Mood: Restorative
- Negative Mood: Restorative

Non-depleted Control

Depleted Control
Mediation Analyses

**Perceived Mental Fatigue**

- Mood x Feedback: \(\beta = .76^{***}\)
- Working Memory: \(\beta = -.29^{**} (-.28^{**})\)

95% CI (-.16 to -2.34)
Mediation Analyses

Mood x Feedback → Working Memory [controlling for perceived mental fatigue] → Anagram Performance

95% CI (.02 to 1.30)
Experiment 2: Discussion

Restorative expectancies induce SRR

• A positive expectancy led to spontaneous recovery [Anagram Performance]
• Recovery driven by change in perceived mental fatigue and, consequently, change in WMC
• Occurred:
  • Absent any differences in motivation
  • Absent any differences in task construal
Contributions

Offers a model of resource restoration

- Explains spontaneous restoration via psychological sources
- Implications for physiological sources as well
  - e.g., a catnap can facilitate resource recovery by: (1) physiological changes, and (2) a positive expectancy
A common process?

<table>
<thead>
<tr>
<th>SRR Factor</th>
<th>M</th>
<th>SD</th>
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<tbody>
<tr>
<td>Self-Affirmation</td>
<td>5.86*</td>
<td>1.57</td>
</tr>
<tr>
<td>No Affirmation</td>
<td>4.33</td>
<td>1.37</td>
</tr>
<tr>
<td>High Power</td>
<td>7.40***</td>
<td>1.84</td>
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<tr>
<td>Low Power</td>
<td>2.00</td>
<td>1.41</td>
</tr>
<tr>
<td>Immersion in Natural Setting</td>
<td>7.14***</td>
<td>1.56</td>
</tr>
<tr>
<td>Immersion in Urban Setting</td>
<td>3.28</td>
<td>1.93</td>
</tr>
</tbody>
</table>

Note: Responses were provided on a 9-pt scale.  
* p < .05  **p < .01  ***p < .001
Future Directions

Temporal Nature of SRR:
• Temporary boost or an actual change in regulatory capacity?
• If an actual change, are resources being constructed or allocated?

Interaction with lay theories of willpower (Job et al., 2010)
• Restorative expectancies bound to those who believe willpower needs restored?

Idiosyncrasies in Expectancies:
• E.g., both social interaction (Vohs, Baumeister, & Ciarocco, 2008) and social exclusion (Baumeister, DeWall, Ciarocco, & Twenge, 2005) are depleting
  • Extroverts $\rightarrow$ positive expectancy toward social interaction
  • Introverts $\rightarrow$ positive expectancy toward social exclusion
• Similar discrepancies for other factors (e.g., Need for Cognition)
Thank you!