The plan

• Part A
  1. Intro: background, common sense
  2. Individual differences/trajectories of adjustment
  3. Thinking about variation and heterogeneity
  4. Questions/discussion
• Part B
  1. Predictors: Why isn’t everyone resilient?
  2. Flexibility in coping and emotion regulation
  3. Laughter
  4. Questions/discussion

Bad things happen

During the course of a normal lifespan . . .
• almost everyone must endure the death of loved ones
• most are exposed to at least one and often several violent or life-threatening event(s)
• Weekly internet check list of life events:
  – average for 4 years = 6 PTEs
  – at recall, most under-remembered
Nonetheless, such events can be deeply distressing, and sometimes debilitating

Lalande & Bonanno (2011) Psychological Trauma
The poignancy of these events has driven both clinical and scientific inquiry toward a primary focus on psychological damage.

1. Psychopathology (e.g., PTSD)
2. Average impact of the event itself

The limits of diagnoses and the problem of averages

1. Focus on extreme: psychopathology
   - Grief related pathology (10%-65%)
   - Posttraumatic Stress Disorder (PTSD) (5%-90%)
   - Limitations
     - Emphasis on pathology can result in sampling bias
The limits of diagnoses and the problem of averages

1. Focus on extreme: psychopathology
   - Grief related pathology (10%-65%)
   - Posttraumatic Stress Disorder (PTSD) (5%-90%)
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   - Emphasis on pathology can result in sampling bias
   - Uninformative about the underlying distribution

The Limits of diagnoses and the problem of averages

1. Focus on extreme: psychopathology
   - chronic grief and depression (10%-65%)
   - Posttraumatic Stress Disorder (PTSD) (5%-90%)
2. Focus on average: impact of the event
   - Compare groups exposed vs. non-exposed
   - Compare across different types of events

The limits of diagnoses and the problem of averages

2. Focus on average: impact of event:
   1. Compare groups exposed vs. non-exposed
   2. Compare average duration of response

• Limitations
  – Uninformative about underlying distribution
  – Potentially misleading conclusions
    • Average is often mistaken for mode
    • Average differences may be driven by extreme groups

Bonanno (2004); Bonanno, Westphal, & Mancini (2011). ACP

The problem with averages

Psychopathology

Average response

Super-coper? Pathological?
A broader approach: Mapping individual differences

- Phase I:
  - individual differences
  - trajectories of outcome

Bonanno et al., 1995, JPSP

Chronic Grief

Late Recovery

Early Recovery

Resilience

Bonanno et al., 1995, JPSP

### Changing Lives of Older Couples (CLOC): A prospective study

- 1,532 married individuals from Detroit area
- 205 lost a spouse during the 7-year course of the study,
  - interviewed prior to bereavement (on average 3 years pre-loss),
  - interviewed at least twice after bereavement (6 and 18 months post-loss)

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#### Table 2

<table>
<thead>
<tr>
<th>Time Point</th>
<th>Phased (n = 111)</th>
<th>Recovered (n = 11)</th>
<th>Minimal (n = 11)</th>
<th>Delayed (n = 0)</th>
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<td>SD</td>
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<td>6 months</td>
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<td>13.33</td>
<td>2.08</td>
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<td>14 months</td>
<td>14.30</td>
<td>3.47</td>
<td>13.33</td>
<td>2.08</td>
<td>12.34</td>
</tr>
</tbody>
</table>

Bonanno et al., 1999, Cog. Ther & Res

---
Resilience = normal, healthy

- No evidence for delayed grief
- Not unhealthy on any pre-loss measures
  - normal quality marriage
  - Not rated as cold or social inept by interviewers
- Higher scores on pre-loss protective factors
  - Belief in just world
  - Acceptance of death
  - instrumental support
Depressed-improved Individuals?

- *Prior to the loss . . .*
- Ill spouse
- Poorer quality marriages
- More introspective and emotionally unstable
- lowest levels of instrumental support,
- believed that the world was particularly unjust to them ("everyone gets the breaks but me").
Resilient and improved evidence healthy adjustment during bereavement

- lowest in
  - grief symptoms (e.g., yearning),
  - processing of the loss,
  - searching for meaning,
  - avoidance/distraction,
- highest in
  - positive affect
  - Comfort from positive memories of deceased

Bonanno, Wortman & Nesse (2004). Psychology and Aging

A broader approach: Mapping individual differences

- phase I: Identifying trajectories of outcome
  - Limitations:
    - Unsophisticated (“by hand” or primitive algorithm)
    - Theory driven
    - Not sensitive to parameters of heterogeneity
- phase II: Latent trajectory modeling
“Le Petit Prince” Antoine de Saint-Exupéry

Heterogeneity
Latent Growth Mixture Modeling (LGMM):
trajectories with random effects: unique distributions
German Panel Data
Nationally representative sampling of German Households followed 19 years (1984-2003)
N = 16,795
DV = life satisfaction
EVENTS:
- unemployment
- layoff
- marriage
- divorce
- death of spouse
- birth of child

Clark, Diener et al. (2008)
The Economic Journal
Widowhood (4 latent growth trajectories)


Clark et al. (2008)
Divorce (3 latent growth trajectories)

Years before and after divorce

Mancini, Bonanno, & Clark (2011). *J Individual Diff*
PARENTHOOD

Four Class Growth Mixture Model (n=2419).

Stable high 84.2%
Increasing 4.3%
Decreasing 7.2%
Stable low 4.2%


Traumatic injury (US)

- 330 men and women
- Single-incident traumatic injury (motor vehicle crash, fall, gun-shot)
- Taken to level 1 trauma center
- Required emergency surgery
- PTSD and depression
  - Hospitalization
  - 1 month post-hospitalization
  - 3 month post-hospitalization
  - 6 month post-hospitalization

DeRoon-Cassini, Mancini, Rusch, & Bonanno (2010) Rehabilitation Psychology

PTSD symptoms (standardized) at hospitalization and 1, 3, and 6 months post-hospitalization

Spinal Cord Injury

- 233 SCI patients recruited from spinal cord centers in England, Switzerland, Sweden, Germany, Austria, and Ireland.
- Data collected soon after injury and at 3 months, 12 months, and 24 months

Bonanno, Kennedy, Galatzer-Levy, Lude, & Ellison (2012)
The Psychological Cost of War

- The Millennium Cohort Study (Tyler Smith et al.)
  - Prospective, with pre- and post-deployment data
  - Large pool (Ongoing enrollment targets 140,000; 77,047 enrolled in initial panel, 30% deployed)
  - Confidential/anonymous
Bonanno et al., 2012, Brit. J Psychiatry

Bonanno et al., 2012, Brit J Psychiatry

Bonanno, Bonanno, Hanna, Miron (2013)

Bonanno, Bonanno, Hanna, Miron (2013)
<table>
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<tr>
<th>Event</th>
<th>Resilient</th>
<th>Chronic</th>
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<td>Bereavement</td>
<td>53%</td>
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<tr>
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<td>17%</td>
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<td>21%</td>
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<td>6%</td>
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<td>SARS (bio-disaster)</td>
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<td>Breast cancer surgery</td>
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<td>72%</td>
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<td>7%</td>
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<td>Combat deployment</td>
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<td>Spinal cord lesion</td>
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<td>mudslide</td>
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<td>10%</td>
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</table>

Resilience and positive adjustment

- Absence of symptoms and distress
- Subjective well-being and life satisfaction
- Level of mental health and functioning
  - Less cortisol dysregulation (diurnal profile) (Ong et al., 2011)
- Positive adjustment as rated confidentially by close friends-relatives
  - Bereaved partners (Bonanno et al., 2004)
  - High-exposure survivors of 9/11 (Bonanno et al., 2005)
- Positive experiences
  - Positive body image after cancer surgery (Lam et al., 2012)
  - Comfort from positive memories of deceased (Bonanno et al., 2003)

Resilience after **isolated** PTEs

- occurring circumstances
- Resilience as **minimal response or rapid return to baseline**
Bonanno & Diminich, 2013, J Child Psychology Psychiatry

Resilience after isolated PTEs
- occurring circumstances
- Resilience as minimal response or rapid return to baseline

Resilience following chronic adversity
- pervasive and enduring aversive life circumstances
- Resilience as eventual emergence of positive outcomes
Child acute PTE: Traumatic Injury (Australia)
Children (6-16 years) admitted to pediatric ER for injury (n = 180)

Adult chronic: Palestinians in West Bank and Gaza
Mass casualty and chronic political violence (N= 764)
A broader approach: Mapping individual differences
- phase I: Identifying trajectories of outcome
- phase II: Latent trajectory modeling
- phase III: Predictors
A broader approach: Mapping individual differences

• phase I: Identifying trajectories of outcome
  – Limitations:
    • Unsophisticated ("by hand" or primitive algorithm)
    • Theory driven
    • Not sensitive to parameters of heterogeneity

• phase II: Latent trajectory modeling

• phase III: Predictors

Why are most but not all resilient?

• Many people evidence minimal-impact resilient outcomes
  • Large group: 33% - 66% and typically a majority
  • Heterogeneity: Different people, different experiences, different backgrounds
  • Likely many different routes to the same end
• Multiple and sometimes unexpected predictors

Predictors of resilient outcomes?
Multiple, unique predictors of resilient outcomes

- Pre-event context
  - Demographic factors (age, gender)
  - Preparation and prior exposure
  - Economic resources (employment, income)
  - Beliefs (acceptance of death, justice, shared cultural norms)
  - Social resources (support, social network)
  - Personality (trait self-enhancement, optimism, hardiness, coping self-efficacy, perceived control, etc)
- Genetic disposition (G X E)
- Proximal exposure
  - Witnessing death, serious injury to others
  - Objective danger to self
  - Extent of loss (death, loss of property)
- The aftermath (distal exposure)
  - Distal exposure (loss of economic, personal, or health resources)
  - Reduced search for meaning, worry, rumination
  - Reduced ongoing stress
  - Coping and appraisal
  - Positive emotion and emotional flexibility

Bonanno, Brewin, Kaniasty, & La Greca (2010). Psychological Science in the Public Interest
Representative sample of New Yorkers first 6 months after 9/11 (N = 2752)

Bonanno, Galea et al. (2006, 2007) Psychological Science; JCCP
Multiple, unique predictors of resilient outcomes

- **Pre-event context**
  - Demographic factors (age, gender, education)
  - Preparation and prior exposure
  - Economic resources (employment, income)
  - Beliefs (acceptance of death, justice)
  - Social resources (support, social network)
  - Personality (trait self-enhancement, optimism, hardiness, coping self-efficacy, ego-resiliency, etc).
  - Genetic disposition (G X E)

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  - Ongoing stress
  - Coping and appraisal
  - Positive emotion and emotional flexibility
Multiple, unique predictors of resilient outcomes

- **Pre-event context**
  - Demographic factors (older, male, greater education)
  - Preparation and prior exposure
  - Economic resources (employment, income)
  - Beliefs (acceptance of death, justice)
  - Social resources (support, social network)
  - Personality (trait self-enhancement, optimism, hardness, coping self-efficacy, ego-resiliency, etc)
  - Genetic disposition (G x E)

- **Proximal exposure**
  - Witnessing death, serious injury to others
  - Objective danger to self
  - Extent of loss (death, loss of property)

- **The aftermath (distal exposure)**
  - Less resource loss (economic, personal, or health)
  - Search for meaning, worry, rumination
  - Less ongoing stress
  - Coping and appraisal: challenge (vs. threat), fighting spirit
  - Positive emotion and flexibility

Predictors and clinical implications

- **Resilient:**
  - Chronic 5-30%
  - Delayed 0-15%?
  - Recovery 15-25%
  - Resilience 35-65%
Predictors and clinical implications

- Resilient:
  - not likely to show delayed elevations
  - Support, comfort, perhaps consultation but...
  - treatment is not indicated
- Early difficulties (i.e., elevated symptoms lasting several months or longer)

### Diagram:
- Disruptions in normal functioning over time:
  - Chronic (5-30%)
  - Delayed (0-15%)
  - Recovery (15-25%)
  - Resilience (35-65%)

Predictors and clinical implications

- Resilient:
  - not likely to show delayed elevations
  - Support, comfort, perhaps consultation but...
  - treatment is not indicated
- Early difficulties (i.e., elevated symptoms lasting several months or longer)
  - Deficits in emotion regulation ability
Regulatory Flexibility

- Their dynamic nature (Folkman, Gross)
  - Person-situation interaction
  - Shifting nature of situational demands
- In practice, we tend to categorize strategies as generally adaptive (e.g., support seeking, reappraisal, finding meaning) or generally maladaptive (e.g., avoidance, suppression)
- “Fallacy of uniform efficacy” (Bonanno & Burton, in press)

Bonanno, 2012, Memory; Bonanno et al. 2004, Psych Science; Bonanno & Burton, in press, Perspectives

Costs and benefits in nature

- Costs
  - The peacock’s colorful tail
Costs and benefits in nature

- There is no such thing as a perfect adaptation
- Every adaptation in nature has both benefits and cost
- The Cheetah’s speed
Regulatory Flexibility

- “Fallacy of uniform efficacy”
- Different aversive situations present different challenges (e.g., Hurricane vs. terrorist attack vs. abuse vs. loss vs. serious injury)
- A given regulatory behavior may be adaptive in one context but less adaptive or even maladaptive in another, or at another point in time

(Bonanno, 2012, Memory; Bonanno et al. 2004, Psych Science; Bonanno & Burton, in press, Perspectives on Psychological Science)

Regulatory Flexibility

- Adaptation requires flexible use of regulatory behaviors and strategies
  - 3 sequential components
    - Ability to read the demands of the situation (context sensitivity)
    - Broad repertoire of regulatory responses
    - Monitor feedback from environment and adjust behavior as needed

(Bonanno & Burton, in press, Perspectives on Psychological Science)
Re-evaluate demands and opportunities

Evaluate demands and opportunities

Select regulatory strategy

Monitor and modify as needed

Maintain strategy

Cease strategy

Adjust strategy

Select a new strategy

CONTEXT SENSITIVITY

REPertoire

FEEDBACK

INDIVIDUAL DIFFERENCES


**Context sensitivity**

- Emotions are functional as evolved as solutions to specific threats and opportunities
  - **Fear**:
    - Affect: concentrates attention on immediate threat, rapidly prepare to flee or fight.
    - Expression: signals others of danger, etc.
  - **Sadness**:
    - Affect: attention is turned inward, fosters adjustment/recalibration of beliefs and expectations
    - Expression: signals others of the need for assistance

**Context sensitivity**

- The functions of emotions are “context bound” (Cole et al., 1994)
- Emotional responding that is sensitive to context (emotion match the situational context) allows us to take advantage of this evolved and highly adaptive system . . .
- . . . which in turn promotes mental health
- Emotional responding that is not sensitive to context (emotions occur irrespective of context (mismatch) can lead to dysregulation and psychopathology

**Context insensitivity and psychopathology**

- Depression (MDD): Less modulation of sadness across contexts (e.g., sad and neutral films) (Rottenberg et al., 2002, 2005)
- Depressed bereaved
  - Complicated Grief (CG): less modulation across interview contexts (Diminic & Bonanno, 2013) and film contexts (Hullock & Bonanno, 2012)
  - Modulation of negative emotions across interview contexts early in bereavement predicted the recovery pathway (reduced depressive symptoms later in bereavement) (Coffman & Bonanno, 2010)
Why is lack of expressiveness a problem?

- Sadness helps us recalibrate but also signals others that we need help, care
- Sad expressions evoke sympathy in others
Why is lack of expressiveness a problem?

- Sadness helps us recalibrate but also signals that we need help, care
- Sad expressions evoke sympathy in others
- Prolonged expressions of pain/distress become difficult for support providers to bear
- Lack of expressiveness...
  - Removes this valuable communicative function
  - Leads to further social isolation
- Another important piece of the puzzle...
- ... oscillation...
Stress reactivity: a pendulum with friction

Bisconti, Bergeman, & Boker (2006)

Average fluctuations in well-being following the death of a spouse

Bisconti, Bergeman, & Boker (2006)

Daily fluctuations in well-being following the death of a spouse

Bisconti, Bergeman, & Boker (2006)
Why oscillate?

Efficiency (emotions do their job, run their course, become less necessary over time)

Adaptive

• Hence we did not have the luxury of tuning the world out for long periods of time
• Oscillation provides opportunities to re-engage the world, remain alert for dangers, reconnect with others
• ... opportunity for positive emotion signals

• WTC resilience and laughter
  – CG example (4:30-6:45; 13:30-15:30) (no sound)
  – [wtc1143] (0:25 – 9:45) (with sound)

Positive Emotion Signals
Two functions of Laughter and Smiling

• **Foster self-regulation**
  – Breather (Lazarus, Kanner, & Folkman, 1980)
  – helps *undo negative emotion* (Fredrickson, 2001)
  – associated with distancing, reinterpreting, or reframing of negative events (akin to humor)

• **Social benefits**
  – laughter is pro-social, increases group cohesion
  – laughter is *contagious* and evokes positive responses in others

Bonanno, & Keltner (1997); JAP; Keltner & Bonanno (1997); JPSP

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Duchenne expressions

- Orbicularis oculi
- Smiling muscle

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Intentional non-Duchenne smile

Spontaneous Duchenne smile       Intentional non-Duchenne smile
Duchenne expressions?

Duchenne and non-Duchenne smiles

- Duchenne and non-Duchenne expressions appear to be associated with different neural pathways
- **nonDuchenne** expressions are associated with social politeness; also concealment, deception
- Only "Duchenne" expressions are associated
  - with genuine positive emotion, contagion
  - evoke favorable responses from untrained observers
  - consistently predict favorable long-term outcome following adversity

Bonanno & Keltner, 1997; Bonanno et al., 2007; Keltner & Bonanno, 1997; Ong et al., 2010, 2011; Papa & Bonanno, 2014
Duchenne expressions evoke positive response in untrained observers

Keltner & Bonanno (1997) JPSP

Table 8
Correlations Between Measures of Laughter, Smiling Behavior, and Observers’ Responses

<table>
<thead>
<tr>
<th>Observer’s response</th>
<th>Duchenne laughter</th>
<th>Non-Duchenne laughter</th>
<th>Duchenne smile</th>
<th>Non-Duchenne smile</th>
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</table>

Fallacy of uniform efficacy:
- expression = good
- suppression = bad

Suppression can be adaptive
- Bonanno et al. (1995). “When avoiding unpleasant emotion might not be such a bad thing” JPSP

The expression or suppression of emotion is not as important as is the “suppress emotional expression in accord with situational demands” (Bonanno et al., 2004).

Expressive Flexibility

- Measured experimentally as ability to enhance or suppress expression of emotion relative to own baseline
- Both enhancement and suppression ability (and their combination as a flexibility score) predicted better adjustment...
  - during bereavement (Gupta & Bonanno, 2010)
  - after high cumulative life stress (Westphal et al., 2010)
  - following the 9/11 terrorist attack (Bonanno et al., 2004)

- Repertoire
  - Tool box of possible regulatory behaviors and strategies
    - Fallacy of uniform efficacy:
      - expression = good
      - suppression = bad
    - Suppression can be adaptive
      - Bonanno et al. (1995). “When avoiding unpleasant emotion might not be such a bad thing” JPSP
    - The expression or suppression of emotion is not as important as is the “suppress emotional expression in accord with situational demands” (Bonanno et al., 2004).
Next steps

- Further exploration of context sensitivity and repertoire using longitudinal and prospective designs
  - How these components relate to each other
  - Measuring “affective flexibility” (e.g., biomarkers of affective experience; EEG and facial EMG)

Coping Flexibility

- Historically, clinical theories have emphasized confronting/processing the traumatic event
- However, recent research shows the advantage of focusing beyond the trauma: optimism, distraction, active coping and rebuilding, finding new goals and opportunities
- Bereavement: Stroebe & Schut dual process model
- The Perceived Ability to Cope with Trauma (PACT) scale (Bonanno, Pat-Horenczyk, & Noll, 2011. Psychological Trauma)

Perceived Ability to Cope with Trauma (PACT)

- Examined numerous pairs of opposing coping items specific to aversive life events
- Confirmatory factor analyses using samples (US and Israel) revealed two factors:
  - Trauma focus (focusing on the event)
  - Forward focus (moving beyond the event)
- Validity: Both forward focus and trauma focus unrelated to trauma exposure, social desirability, or neuroticism, positively related to ego-resiliency

Bonanno, Pat-Horenczyk, & Noll (2011). Psychological Trauma
Perceived Ability to Cope with Trauma (PACT)

- **Sample:** 315 students of Hebrew University (Jerusalem) recruited for likely high exposure to terrorist violence.
- **Predicted results:** Both forward focus and trauma focus independently predicted reduced PTS and interacted with trauma exposure.
- Flexibility (relatively balanced, high scores on both measures) predicted less change in PTS at higher levels of trauma exposure.

Bonanno & Geraci (2011) 
Flexibility During and After Combat Deployment 
Prospective study of US army soldiers deployed in Afghanistan

- Resilient class (81.5%)
  - Greater trauma focus during deployment
  - Greater forward focus after deployment

- Chronic class (7.3%)
  - Greater forward focus during deployment
  - Greater trauma focus after deployment

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So . . . bad things happen

- Observable individual differences (heterogeneity)
  - Some people are severely distressed
  - Some people struggle and recover
  - Most people are generally ok soon afterwards
- There are multiple and unexpected predictors
  - Context sensitive emotion - oscillation
  - Repertoire of regulatory strategies
  - Ability to monitor feedback and adjust