Psychological effects of the COVID-19 pandemic: Results of a longitudinal study

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Outline

+ Background of the longitudinal study
+ Theory: Event System and Transition Theories
+ Empirical Evidence
  + Study 1: Subjective Wellbeing
  + Study 2: Personality and Stress
  + Study 3: Family Life
  + Study 4: Age Perceptions
  + Study 5: Work Performance
+ General Discussion
Outline

+ Research funded by the VolkswagenStiftung
+ In cooperation with Prof. Dr. Hannes Zacher (Leipzig University)
+ Project website and interactive data dashboard: https://momentum-leipzig.github.io/Dashboard/
The COVID-19 Pandemic in Germany

### Daily change

**New cases**

- **Germany**
  - Total cases: 2.11M
  - New cases: 8,277
  - 7-day avg: 13,380

**All time**

- **Germany**
  - Total cases: 2.11M

### Worldwide

- **Total cases**: 96.2M
- **Recovered**: 53.1M
- **Deaths**: 2.06M

![Graph showing daily change in cases and deaths](chart.png)

Each day shows new cases reported since the previous day. Updated less than 2 days ago. Source: JHU CSSE COVID-19 Data.
The COVID-19 Pandemic in Germany

"Since German reunification, no, since the Second World War, there has not been a challenge to our country that depends so much on our joint action in solidarity."

"It's serious. Take it seriously too."

"Of course, each of us in such a situation is full of questions and worries about how things will continue."

Chancellor Angela Merkel on March 18th, 2020
Study Background

- Longitudinal study on work, age, and health
  - Beginning at the beginning of December 2019 (representative sample of ~1,500 full-time employees in Germany)
  - Original Plan: 4 surveys total, at intervals of 3 months each in the first week of the month
  - Updated Plan: Starting in March 2020, monthly surveys each in the first week of the month (18 waves total: December 2019…March 2020-July 2021)
Study Background

+ Major Events:
  + January 27, 2020: First cases reported in Germany
  + March 12, 2020: WHO declares COVID-19 a pandemic
  + March 16, 2020: First round of public restrictions (i.e., “lockdown”) imposed
  + April 20, 2020: First “easing” of public restrictions
  + November 11, 2020 - Present: Second round of public restrictions (i.e., “lockdown”) imposed [anticipated until at least February 14, 2021]

https://ourworldindata.org/covid-exemplar-germany
Study
Background

+ As of January 2021, what is restricted?
  + Employers must, wherever possible, allow employees to work from home until March 15.
  + Nonessential shops and services remain closed.
  + People in shops and on public transport will be required to wear filter masks such as FFP2 respirators.
  + Contact at private meetings is restricted to just one other person not living in the same household.
  + Day care centers are closed, but parents can take paid holidays in order to look after their children.
  + Schools are largely closed and students are taught through distance learning.
Theoretical Background

- Event System Theory (Morgeson et al., 2015)
  - Explains the properties of events, and their effects over time on different levels
  - Events are independent (in terms of time and place), discontinuous and observable circumstances or activities outside of people and their perception
  - Emphasizes event *strength*, *space*, and *time*

Theoretical Background

+ Event strength (Morgeson et al., 2015)
  + The probability that an event will become salient and lead to changes in (individual, organizational) behavior
  + Those that are abrupt, broad scope, and present significant disruptions to everyday life
Theoretical Background

+ Event space (Morgeson et al., 2015)
+ Events have stronger effects when they arise at a higher level and when they affect several levels
**Theoretical Background**

- Event time (Morgeson et al., 2015)
- New, disruptive, and meaningful events have stronger effects if...
  - ... they take longer (vs. shorter)
  - ... their strength increases over time
Theoretical Background

Transition Theories (Bliese et al., 2017)
- Describe and explain processes before, during, and after the occurrence of events
- Schlossberg (1981): How do people react to critical life events (e.g., beginning college, retirement)?
- Transition: “…if an event or nonevent results in a change in assumptions about oneself and the world and thus requires a corresponding change in one’s behavior and relationships…” (Schlossberg, 1981, p. 5)

Theoretical Background

Transition Theories (Bliese et al., 2017)

+ Adaptation to transition: “…a process during which an individual moves from being totally preoccupied with the transition to integrating the transition into his or her life…” (Schlossberg, 1981, p. 7)

+ “Crisis theory”: a crisis is a “…relatively short period of disequilibrium in which a person has to work out new ways of handling a problem…” (Moos & Tsu, 1976, p. 13)
Theoretical Background

+ Modeling Transition Theories
+ Bliese et al. (2017): Discontinuous Growth Model
+ Components:
  + (1) An event that leads to an immediate “transition” response
  + (2) The temporal processes that are influenced by the event
  + (3) The theoretical interpretation of the changes over time
Modeling Transitions & Discontinuities

Bliese et al. (2017): Discontinuous Growth

Model Parameters:

1. Pre-event ($\text{TIME}_{\text{pre}}$) - history before the event occurred
2. Transition (TRANS) - contrast between the values before and immediately after the event
3. Recovery (RECOV) - course after the event (increase or decrease)
Modeling Transitions & Discontinuities

+ General Discontinuous Growth Modeling (aka. “spline” growth modeling; Grimm, Ram, & Estabrook, 2016; Schuelke & Terry, 2003; Singer & Willet, 2003)
  + Flexible framework for parameterizing pre/post change and modeling non-linear patterns of growth over time
  + Fewer assumptions about transition; focuses instead on form of change pre/post event

+ Example Parameters:
  + (1) Pre-event Slope ($B_{pre}$)
  + (2) Post-event Slope ($B_{post}$)
Study 1: Subjective Wellbeing

Study 1: Subjective Wellbeing

+ How have life satisfaction and positive and negative moods (affect) changed during the first “lockdown” in Germany (mid-March - early May 2020)?

+ What role did “stress appraisals” and “coping strategies” (Lazarus & Folkman, 1984; Carver, Scheier, & Weintraub, 1987) play?
Study 1: Subjective Wellbeing

### Number of infections (daily new infections) in Germany

<table>
<thead>
<tr>
<th>Date</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>7</td>
<td>57 (51)</td>
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<tr>
<td>821</td>
<td>74,508 (6,173)</td>
</tr>
<tr>
<td>6,623</td>
<td>163,009 (1,068)</td>
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</table>

### Number of deaths in Germany

<table>
<thead>
<tr>
<th>Date</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>821</td>
<td>0</td>
</tr>
<tr>
<td>6,623</td>
<td>0</td>
</tr>
</tbody>
</table>

### Timeline

- **Early December**: First cases of new disease reported in Wuhan, China
- **End of December**: China reports cases officially to WHO
- **27 January**: First infection in Germany
- **11 February**: WHO names Sars-CoV-2 and COVID-19
- **8 March**: First death in Germany
- **11 March**: WHO declares pandemic
- **22 March**: Restrictions of business and public life in Germany (until 19 April)
- **16 March**: Daycares and schools close in Germany
- **From 20 April**: Easing of restrictions in Germany

### Measurement waves

- **Time 1** (N=1,583)
- **Time 2** (N=1,204)
- **Time 3** (N=996)
- **Time 4** (N=887)

### Constructs assessed

- Subjective wellbeing
- Demographic and control variables
- Subjective wellbeing
- Stress appraisals
- Coping strategies
- Subjective wellbeing
Study 1: Subjective Wellbeing

+ Measures…
  + Life Satisfaction: single item
  + Stress Appraisals (Peacock & Wong, 1990)
  + Coping Strategies (COPE; Carver, 1997)

+ All data, R code to replicate the analyses, and complete results are available at https://osf.io/5dtu2/
Study 1: Subjective Wellbeing

Conditional Multivariate Discontinuous Growth Model
### Study 1: Subjective Wellbeing

#### Table 2
Relevant Results of Unconditional Multivariate Discontinuous Growth Model Predicting Subjective Wellbeing Outcomes

<table>
<thead>
<tr>
<th>Subjective wellbeing outcome</th>
<th>Parameter description</th>
<th>Estimate</th>
<th>SE</th>
<th>Z</th>
<th>p</th>
<th>95% CI</th>
<th>Lower</th>
<th>Upper</th>
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<tbody>
<tr>
<td>Life satisfaction</td>
<td>Intercept (May 2020)</td>
<td>4.96</td>
<td>0.04</td>
<td>126.9</td>
<td>&lt;.001</td>
<td>4.89</td>
<td>5.04</td>
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<tr>
<td></td>
<td>Slope 1: December 2019 to March 2020</td>
<td>0.01</td>
<td>0.01</td>
<td>0.45</td>
<td>.652</td>
<td>-0.02</td>
<td>0.03</td>
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<tr>
<td></td>
<td>Slope 2: March 2020 to May 2020</td>
<td>-0.11</td>
<td>0.03</td>
<td>-4.29</td>
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<tr>
<td>Positive affect</td>
<td>Intercept (May 2020)</td>
<td>4.24</td>
<td>0.04</td>
<td>120.41</td>
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<td>4.17</td>
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<td>Slope 1: December 2019 to March 2020</td>
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<td>Negative affect</td>
<td>Intercept (May 2020)</td>
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<td>0.04</td>
<td>71.07</td>
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<td>Slope 2: March 2020 to May 2020</td>
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<td>0.02</td>
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<td>.034</td>
<td>-0.09</td>
<td>-0.00</td>
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*Note.* $N = 1,588.$ CI = confidence interval.
### Study 1: Subjective Wellbeing

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*Note.*  
*N = 1,588.*  
*CI = confidence interval.*
Study 1: Subjective Wellbeing
Study 1: Subjective Wellbeing

+ Individual differences in life satisfaction:
  + Positively related to controllability appraisals, active coping, and positive reframing
  + Negatively related to threat and centrality appraisals, and planning.

+ Individual differences in positive affect
  + Positively related to challenge and controllable-by-self appraisals, active coping, using emotional support, and religion
  + Negatively related to threat appraisal and humor.

+ Individual differences in negative affect
  + Positively related to threat and centrality appraisals, denial, substance use, and self-blame
  + Negatively related to controllability appraisals and emotional support
Study 1: Subjective Wellbeing

+ Changes in Wellbeing:

<table>
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<tr>
<th>Stress appraisals</th>
<th>Intercept</th>
<th>Slope</th>
<th>Intercept</th>
<th>Slope</th>
<th>Intercept</th>
<th>Slope</th>
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<td>Threat appraisal</td>
<td>-0.16</td>
<td>0.06</td>
<td>-0.17</td>
<td>0.03</td>
<td>0.693</td>
<td>-0.17</td>
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<td>Challenge appraisal</td>
<td>0.07</td>
<td>0.07</td>
<td>0.300</td>
<td>0.01</td>
<td>0.840</td>
<td>0.19</td>
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<td>Centrality appraisal</td>
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<td>0.06</td>
<td>0.014</td>
<td>0.04</td>
<td>0.316</td>
<td>-0.10</td>
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<tr>
<td>Controllable-by-self</td>
<td>-0.22</td>
<td>0.06</td>
<td>&lt;0.001</td>
<td>0.01</td>
<td>0.312</td>
<td>-0.22</td>
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<td>Controllable-by-others</td>
<td>0.13</td>
<td>0.05</td>
<td>0.010</td>
<td>0.01</td>
<td>0.289</td>
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<td>Uncontrollable</td>
<td>-0.06</td>
<td>0.05</td>
<td>0.233</td>
<td>0.04</td>
<td>0.153</td>
<td>-0.03</td>
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Coping strategies

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<th>Active coping</th>
<th>Intercept</th>
<th>Slope</th>
<th>Intercept</th>
<th>Slope</th>
<th>Intercept</th>
<th>Slope</th>
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<td>Planning</td>
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<td>0.05</td>
<td>0.249</td>
<td>0.02</td>
<td>0.527</td>
<td>-0.05</td>
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<tr>
<td>Positive reframing</td>
<td>0.11</td>
<td>0.05</td>
<td>0.022</td>
<td>0.04</td>
<td>0.214</td>
<td>0.06</td>
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<tr>
<td>Acceptance</td>
<td>0.02</td>
<td>0.05</td>
<td>0.060</td>
<td>0.02</td>
<td>0.498</td>
<td>0.02</td>
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<tr>
<td>Humor</td>
<td>&lt;0.01</td>
<td>0.05</td>
<td>0.985</td>
<td>0.02</td>
<td>0.324</td>
<td>&lt;0.04</td>
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<td>Religion</td>
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<td>0.144</td>
<td>&lt;0.01</td>
<td>0.534</td>
<td>0.09</td>
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<tr>
<td>Emotional support</td>
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<td>0.05</td>
<td>0.081</td>
<td>0.06</td>
<td>0.035</td>
<td>0.01</td>
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Instrumental support

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<tr>
<th>Instrumental support</th>
<th>Intercept</th>
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<th>Intercept</th>
<th>Slope</th>
<th>Intercept</th>
<th>Slope</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning</td>
<td>-0.02</td>
<td>0.06</td>
<td>0.696</td>
<td>0.05</td>
<td>0.280</td>
<td>-0.03</td>
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<td>Positive reframing</td>
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<td>0.05</td>
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<td>0.06</td>
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<td>Substance use</td>
<td>-0.05</td>
<td>0.06</td>
<td>0.399</td>
<td>-0.05</td>
<td>0.266</td>
<td>0.13</td>
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<tr>
<td>Behavioral disengagement</td>
<td>-0.01</td>
<td>0.05</td>
<td>0.921</td>
<td>-0.02</td>
<td>0.466</td>
<td>0.05</td>
</tr>
<tr>
<td>Self-blame</td>
<td>-0.07</td>
<td>0.07</td>
<td>0.317</td>
<td>0.05</td>
<td>0.100</td>
<td>0.04</td>
</tr>
</tbody>
</table>

Demographics

| Age                  | <0.01     | <0.01  | 0.648     | <0.01 | 0.700     | <0.01 |
| Gender               | -0.07     | 0.09   | 0.439     | -0.05 | 0.493     | -0.16 |
| Income               | 0.08      | 0.03   | 0.002     | -0.01 | 0.215     | 0.04  |
| Education            | -0.13     | 0.04   | 0.001     | -0.06 | 0.006     | -0.02 |
| Industry             | -0.04     | 0.12   | 0.739     | -0.06 | 0.323     | 0.18  |
| Region               | 0.08      | 0.08   | 0.296     | 0.03  | 0.508     | 0.14  |

Note. N = 979. B0 and B1 refer to intercepts and slopes, respectively (see also Figure 2).
* 0 = Male, 1 = female. * 0 = Primary and secondary sector, 1 = tertiary sector. * 0 = Northern Germany, 1 = Northern Germany.
Study 1: Subjective Wellbeing

- Discussion
  - Relatively small effects on subjective well-being
  - Unexpected decrease in negative affect, "Pandemic Fatigue"?
  - Prediction of inter-individual differences vs. intra-individual change
Job Satisfaction During COVID

- 1st lock down
- 2nd lock down
Study 2: Personality and Stress

Study 2: Personality and Stress

How has the perceived stress due to the COVID-19 pandemic developed over time?

+ "Lockdown": April 2020
+ "Relaxation": May 2020 to July 2020
+ Summer holidays: August 2020 and September 2020

Hypothesis 1: Decrease in perceived stress between April 2020 and September 2020, with a greater decrease between April 2020 and July 2020 than between July 2020 and September 2020.
Study 2: Personality and Stress

What role do personality traits play?
- Big Five: extraversion, emotional stability, conscientiousness, agreeableness, openness to experience

Differential reactivity model of personality and stress (Bolger & Zuckerman, 1995; Vollrath, 2001)
- Hypothesis 2: The average perceived stress is positively related to extraversion and negatively to emotional stability.
- Hypothesis 3:
  + Extraverted individuals show greater increases in stress between April and July 2020 and greater decreases between July and September 2020.
  + Emotionally stable individuals show greater decreases in stress between April and July 2020 and weaker decrease between July and September 2020.
Study 2: Personality and Stress

+ Measurement
  + BFI: Johns et al. (1991)

+ Data and code to reproduce the analyzes, along with full results, can be accessed via our online appendix: https://osf.io/yedwq/?view_only=8c9cdab1dbe74916bbd8afa611d159c7
Study 2: Personality and Stress

- 6 measurement times over 10 months
  - December 2019: personality only
  - April to September 2020 (excluding June)
- N = 588 over all points in time
Study 2: Personality and Stress

Hypothesis 1:

April 2020 - July 2020:
  - $B = -0.131$, $SE = 0.012$, $p < 0.001$

July 2020 - Sept 2020:
  - $B = -0.016$, $SE = 0.018$, $p < 0.381$
Study 2: Personality and Stress

Hypothesis 2: extraversion was positively related (B = .086, SE = .033, p = .008) and emotional stability negatively (B = -.312, SE = .035, p < .001) with average stress experience.

Hypothesis 3: Extraversion was associated with an increase in stress between April and July 2020 (B = .027, SE = .011, p = .015) and a decrease in stress between July and September 2020 (B = -.038, SE = .016, p = .014).
Different Stress Appraisals During COVID

Seeing the situation as...

- Central
- Challenging
- Controlable_Others
- Stressful
- Threatening
- Uncontrollable

Note: Data was missing for June 1st lock down and 2nd lock down.
Study 5: Work Performance
Study 5: Work Performance

- How has the self-assessed work performance (core task performance, adaptivity, proactivity) changed between December 2019 and September 2020?
  - Event System Theory (Morgeson et al., 2015)
  - Transition theories (Bliese et al., 2017; Schlossberg, 2015)
  - Core self-evaluations theory (Judge et al., 1997, 2009)
Study 5: Work Performance

Cumulative number of infections (daily new infections) in Germany

<table>
<thead>
<tr>
<th>Month</th>
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<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
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<td>8</td>
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Cumulative number of deaths (daily deaths)

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Timeline

- **December 2019:** First cases of new disease reported in Wuhan, China
- **January 2020:** First confirmed infection with Sars-CoV-2 in Germany
- **March 2020:** National “lockdown” in Germany: Restrictions of public and business life; daycares and schools closed
- **From 4 May 2020 and throughout the summer:** Gradual easing of restrictions in Germany
- **From September 2020:** Number of new infections is again increasing in Germany

Measurement waves (at the beginning of each month)

- **Time 1 (N=1,510)**
- **Time 2 (1,208)**
- **Time 3 (1,018)**
- **Time 4 (908)**
- **Time 5 (841)**
- **Time 6 (757)**
- **Time 7 (655)**
- **Time 8 (591)**

Study 5: Work Performance

H1: Decrease
H2: Increase
Study 5: Work Performance

Core self-evaluations as a resource (e.g., resilience)

H3: buffering effect
H3: boosting effect

TIME$_{pre}$
TRANS
RECOV
Study 5: Work Performance

+ Measurement
+ Self-reported work performance: Griffin et al., (2007)
Study 5: Work Performance

Results: Pre-Transition Effects (before “lockdown”)

\[ B_{\text{TIMEpre}} = -0.057, \ SE = 0.011, \ p < 0.001 \]

\[ B_{\text{TIMEpre}} = -0.075, \ SE = 0.013, \ p < 0.001 \]
Results H1: Transition Effects (during “lockdown”)

- $B_{\text{TRANS}} = -0.134, SE = 0.040, p = .001$
- $B_{\text{TRANS}} = -0.100, SE = 0.050, p = .045$
Study 5: Work Performance

Results H2: Recovery Effects (after "lockdown")

\[ B_{\text{RECOV}} = 0.031, \ SE = 0.016, p = 0.046 \]
\[ B_{\text{RECOV}} = 0.060, \ SE = 0.018, p = 0.001 \]
\[ B_{\text{RECOV}} = 0.107, \ SE = 0.020, p < 0.001 \]
Study 5: Work Performance

Results H3: Role of CSE

Buffer effect of CSE on transition) not confirmed
Study 5: Work Performance

Results H4: Role of CSE

Boosting effect of CSE partially confirmed

$B_{\text{RECOV}} = .030$, $SE = .015$, $p = .049$

$B_{\text{RECOV}} = .041$, $SE = .018$, $p = .021$
1st lock down

2nd lock down

Work Engagement and Fatigue over Time

Engagement

Fatigue

Subdimension: Cognitive  Emotional  Physical

1st lock down

2nd lock down
General Discussion

+ Theoretical implications:
  + Event System and Transition Theories
  + Meta-concepts resilience and adaptability

+ Practical implications
  + Support from companies and other institutions (federal, state, local governments)
  + Self management (e.g., means of coping; stress appraisals)

+ Future research
  + Home office and work requirements, action regulation (SOC strategies), post-traumatic growth, health behavior, ...
Recommendations for Working Life

+ New challenges and opportunities
  + Changes in activities, forms of work and working relationships
  + Increased burdens, stress and existential worries
  + Increased demands on commitment, flexibility, and creativity
  + Recovery effects from “lockdowns”? 


Occupational Health and Safety

- Employees with frequent contact with customers or clients have had to change their work processes
  - Technical solutions (e.g., transferred from disaster control, military, fire brigades)
  - Daily compliance with safety regulations
- Psychological measures
  - Training (recovery, coping strategies) and prevention / intervention measures (PTSD)
  - Consistent and visible implementation of safety standards (safety climate, support)
Teleworking and Virtual Teamwork

+ Digitization of existing teams and projects
  + Video conferencing to stay in contact with colleagues and customers - motivation and efficiency?
  + Requirements: digital skills
  + Process: clear agenda, preparation, and follow-up
  + Reduce the number and do not plan too closely together
  + Reserve time for informal exchange

+ Open Questions:
  + What is really important for teams? Meaningful tasks, mutual support, recognition
  + What are the lessons for "Post Pandemic"?
Work-Life Balance

While some enjoy greater flexibility and the absence of commuting, others struggle with the balance between work and family.

How can employers support work-life balance?

- Hybrid working time/place models
- Provision of work equipment
- Advice on technical processes (network access, etc.)
- Advice on self-management (time/stress management etc.)
- Flexibility/reduction of working and vacation times
Precarious Employment and Job Insecurity

+ Working people can be affected very differently
  + Some benefit from the increased flexibility and digitization of their work
  + Other groups are faced with additional requirements and uncertainties (older workers, people with language barriers, single parents, people in precarious jobs)

+ Interventions & Open Questions:
  + Improvement of working conditions (i.e., precarious employment is a risk factor for economic/health consequences in the pandemic)
  + Long-term strategies (e.g., increasing minimum wage/basic income, employment protections, etc.)?
HR Management & Leadership

+ HR departments
  + Establish a culture of hygiene, make working hours more flexible
  + Creative solutions to avoid layoffs
  + Visibly support employees and retain them in the long term
  + Use of idle times for training and further education

+ Leadership at a distance (e-leadership)
  + Classic control tasks are made more difficult, but so is the timely recognition of conflicts and problems in the workflow and social support
  + Attention and proactive (crisis) communication, climate of trust, role model functions (e.g., “doing the right thing”)
Thank you!

+ “pandemiedepressionen”
+ “…into which periods is contemporary history divided?”
+ “Before corona, after corona”
+ www.cortrudolph.com