Summary of the final report

During 2016 and 2017, changes in health, safety perceptions and future prospects of residents in Groningen were studied. Some of them are exposed to earthquakes induced by gas extraction. For illustrative background information see recent articles in the Washington Post (https://tinyurl.com/ybfnx4ek), and Guardian (https://tinyurl.com/y9bfa55g). For background information concerning the history of this, see an older article in the New York Times (https://tinyurl.com/ydxttu99).

The study was conducted by the University of Groningen, the public health service of Groningen (GGD Groningen) and the department for Research and Statistics of the Municipality of Groningen. The research was commissioned by the National Coordinator Groningen.

The conclusions in this summary are based on four pieces of research. A dedicated panel were monitored during 2016 and 2017 (>2,150 respondents per measurement). We conducted an additional study with the LifeLines panel (2,912 respondents). Moreover, we cite results from the Public Health Service’s health monitor (16,284 respondents). Finally, 64 residents with damage were interviewed in-depth. The studies support the same conclusions.

This end report summarises and integrates previously published results with new results based on the two most recent surveys (N=2150 in the final wave) and 64 in-depth interviews.

Impact and scale

The studies map the nature and extent of the social and psychological impact of induced earthquakes and other physical consequences of gas extraction. The main results are:

How many people are involved?

- 410,000 residents of the province of Groningen are exposed to induced earthquakes: they live in a postcode area where damage has been recognized by the oil company responsible (NAM, a joint venture of Shell and Exxon).
- 134,363 adults have damage to their property (Postmes et al., 2017c). With children we estimate that approximately 170,000 people have damage.
- 68,343 adults’ homes have been damaged multiple times. If you include children the number affected is approximately 85,000.

What are the consequences?

- Damage caused a drastic drop in perceived safety. Among residents whose homes were damaged multiple times, less than half feel safe in their own homes.
● Damage to homes, in particular repeated damage, significantly increases the risk of stress-related health problems in all three studies.
● Approximately 10,000 adults suffer from stress-related health problems due to damage.¹
● There is a causal link between injury and stress-related health. Lifelines shows that repeated damage, compared to the "baseline" for health in 2012, is responsible for a decrease in stress-related health outcomes. Our dedicated panel confirms that damage leads to a drop in health.
● The health of residents whose homes were damaged multiple times has deteriorated significantly during 2016-2017, compared to people without damage.
● Residents who have suffered repeated damage to homes show increases in absenteeism and have a higher risk of burnout. They report a decline in social and physical functioning.
● During these two years, residents with damage are getting less hopeful, increasingly angry and they feel increasingly powerless.
● Distrust of authorities is high.
● Approximately a quarter of residents have stopped reporting damage to the authorities. One of the reasons for this is a lack of trust.
● Damage has several effects on behavior. Compared to the control group without damage, people with damage are more up to date on the news surrounding gas extraction, offer more help and support to neighbours, are more likely to be involved in protest and have changed their voting behavior.

What are the causes?

● Stress-related health problems are partially caused by a lack of perceived safety.
● The drop in perceived safety has multiple causes. Concerns about physical safety are part of it. But the main causes are uncertainty and concerns about the future (this is expressed in the interviews by statements such as: “our house was supposed to be our retirement—are we ever going to sell it now?”), concerns about the long-term prospects for the region and for homes (“after every earthquake my home is patched up but no one checks if the foundations are still intact”) and fear of the earthquakes themselves ("I feel very unsafe during earthquakes"). In the interviews, nearly all respondents indicate that they are frustrated by the hassle to get damage acknowledged and repaired ("I feel unsafe because of the way damage claims are dealt with: eternal haggling"). Finally, respondents feel that NAM and government do not recognize the problem sufficiently ("the indifference in the Hague").
● Having a lack of confidence in authorities aggravates the perceived lack of safety.
● The interviews show that claims settlement is a major bottleneck for many respondents. This causes severe stress for some.

¹To be exact: Based on the research we estimate that, in comparison with the "control group" who have no damage, among those with damage there are an excess of 4,136 adults whose health is not good; 7,620 have stress-related health problems, 1,800 are at increased risk of anxiety or depression disorders (Postmes et al, 2017c). Because these conditions are sometimes related to one another, we estimate the total overall increase in health problems to affect around 10,000.
People blame their stress on bureaucracy and conflicts concerning damage procedures. They believe procedures are very unfair - this ought not to be possible in the Netherlands. Feelings of injustice exacerbate health problems.

Future outlook
The studies show that a large group is affected. The negative outcomes are increasing. Based on the numbers affected and the different consequences, we expect that the future prospects for many are negative. We expect that a large group will experience lower quality of life and higher healthcare costs. If we combine the numbers with poor scores for general and mental health with the scientific knowledge about the long-term consequences of having such scores, one could predict 5 or more fatalities per year as a consequence of the increase in health problems.

After the earthquake of Zeerijp
Based on the initial analysis of reactions after the earthquake of Zeerijp (8th of January) we conclude the following:

- There is a striking resemblance between the “shakemaps” computed by the Royal Netherlands Meteorological Institute and observations of the respondents on an adapted version of the US Geological Survey’s “did you feel it” questionnaire. This suggests that average respondent reports quite accurately what they felt. Averaged across several respondents, the average resident appears to be a good seismometer, who reports their observations truthfully.
- Feeling the earthquake is directly related to safety perceptions. Those who felt the earthquake themselves feel less safe as a result.
- Residents who felt the quake and who live closer to the epicenter want to share their experiences and their emotions with others more.
- Respondents felt that authorities need to recognize the severity of the issues at stake and indicate that they would like authorities to take swift action. The government is who they look to for action.

Recommendations
The report recommends that a comprehensive and well-coordinated plan is made for this large group of people with (multiple) damages. An integrated approach is necessary because this issue concerns not only safety and psychological well-being, but also social functioning, daily actions and future prospects. We therefore recommend an interdisciplinary approach involving good cooperation between local, regional and national government. Given the low levels of trust in authorities, we recommend using a bottom-up approach as much as possible.

A summary of the key recommendations can be found in the concluding chapter of the end report and in the Dutch summary.