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Perceived threat of climate change in the second half of life

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¹ This is a revised version of the DZA Aktuell of the same name from April 2024 (DOI: 10.60922/zshp-pc84). The original publication was based on an erroneous internal preliminary version of the DEAS 2023 dataset. The present analyses were updated using the final published Scientific Use Files for the DEAS 2023. The deviations are in the range of the first decimal place and do not lead to any changes in the core statements.

Key messages

- **Over one in four people in the second half of life (29%) perceived a high threat from the climate crisis in 2023.** Just over half (51%) rated the threat as medium, while about one in five (21%) perceived only a low threat from the climate crisis.
- **Climate change is perceived as a significantly greater threat than Covid-19.** On average, the threat of the climate crisis in 2023 was rated as 5.8 on a scale of 1 to 10. The perceived threat of Covid-19 was rated on average as only 3.1. Even at the peak of the pandemic in winter 2020/21, the perceived threat of 4.7 was more than one scale point below the perceived threat of the climate crisis in 2023.
- **There are no age differences regarding the perceived threat posed by the climate crisis.** In all four age groups, from middle to old age, the average perceived threat was between 5.6 and 5.9 on a scale of 1 to 10.
- **Women felt more threatened by the climate crisis than men.** However, there were no differences between income and education groups.
- **People with good self-rated health had a lower perception of threat from the climate crisis.** On average, they rated the threat posed by the climate crisis at 5.6, around half a scale point lower than people with medium or poor self-rated health (6.0).
- **People who have children but no grandchildren perceived a greater threat from the climate crisis than those with grandchildren.** The difference between the two groups is just under half a scale point on the ten-point scale (5.6 vs. 6.0). People without children of their own (5.8) did not differ significantly from people with children or grandchildren.

Introduction

Climate change is one of the greatest social challenges of our time. The population of Germany currently consumes so much resources that we would require three planets like the Earth if the rest of the world wanted to live sustainably with the same lifestyle (Bocksch 2023). As climate change progresses, we will face more heat waves, droughts and extreme weather events and increasing exposure to UV radiation and air pollutants, with negative consequences for our livelihoods and health (Winklmayr et al. 2023; Butsch et al. 2023; Baldermann, Laschewski, & Grooß 2023).

As the Intergovernmental Panel on Climate Change 2022 report showed, climate change is progressing faster than expected. According to the latest findings, its consequences will be more devastating than previously assumed. To limit the increase in temperature to 1.5 or at most two degrees Celsius, much more extensive and far-reaching measures will have to be implemented this decade. Accordingly, the Intergovernmental Panel on Climate Change is calling on politicians to act quickly (IPCC 2022).

Following the publication of the Intergovernmental Panel on Climate Change's report, the German government pledged to work towards greater climate protection in Germany and worldwide (Federal Government 2023). As early as 2021, the Federal Constitutional Court ruled that transparent measures for further greenhouse gas reductions must be formulated from an early stage in a way that distributes the reduction burden fairly between generations, without overburdening future generations (Federal Constitutional Court 2021). However, the support of the general population is needed to implement further measures.

People in the second half of life make up an increasing proportion of the overall population. As voters, they influence politics, and as consumers, they contribute to a more

or less sustainable lifestyle in Germany. Their attitudes and behaviour are therefore important in successfully combating climate change.

This edition of DZA Aktuell focuses on the extent to which people in the second half of life feel threatened by the climate crisis, and the extent to which different population groups differ in this respect. The more climate change is perceived as a threat, the more willing people may be to support measures aimed at curbing climate change and mitigating its effects.

Threat perception in different population groups

The extent to which people feel threatened by climate change is likely to depend on their living situation. This may be related to age; older people are particularly affected by climate change, as the physical stress associated with periods of heat or extreme weather events is more likely to impact them. Accordingly, health impairments and increased risk of death caused by climate change particularly affect older people (Rückert-John et al., 2013; Wanka et al., 2014; Winklmayr et al., 2023). People also perceive this to be the case; those aged 65 and over state more frequently than younger people that they are afraid of heatwaves (Rückert-John, Bormann, & John 2013). In this respect, older people may feel more threatened by climate change than younger people because they are more affected by the direct consequences of climate change.

On the other hand, the full effects of climate change will only become apparent in the future, and older people will not experience these to the fullest extent. The question of conflicts of interest between older people and future generations has been a recurring theme in public discourse (Ayalon, Roy, Aloni, & Keating 2023). Nevertheless, many older people also feel the need to leave a future worth living to future generations – especially if they have children or

grandchildren themselves (Ayalon et al. 2023; Frumkin, Fried, & Moody 2012). People who have (grand)children may therefore feel a particularly strong threat from climate change; their descendants could be affected if the consequences of climate change become increasingly noticeable in the coming decades.

Overall, studies have not shown any clear correlations between age and environmental awareness. In an overview article, Striessnig et al. (2022) summarise that many studies have found a particularly high level of environmental awareness among older cohorts and, in some cases, an increased awareness among young people. This can partly be attributed to these two groups growing up during times of strong environmental movements that these generations themselves helped to shape (e.g. the anti-nuclear movement in the 1970s, Fridays for Future today).

In addition to age and family situation, other factors are also likely to play a role in the perception of threat. Previous studies have shown that women in wealthy countries are more concerned than men about climate change (see overview article by Bush & Clayton 2023; Striessnig et al. 2022). Possible explanations include differences in socialisation (girls are more likely to be socialised to focus on the common good), political orientation (on average, women are further to the left of the political spectrum than men, and climate policy is often seen as left-wing policy), employment situation (men are more likely to work in energy-intensive industries) and consumer behaviour (for example, men are more likely to use vehicles that emit a lot of CO₂ and are more likely to eat food that is produced with greater CO₂ emissions) (Bush & Clayton 2023). We therefore assume that women will perceive a greater threat from climate change than men.

Financial situation could also play a role. Increasing living costs resulting from climate change or the combating of it, such as rising food prices and energy costs, pose particular

challenges to people with limited financial resources. People on low incomes are also less able to protect themselves from the negative effects of climate change. They often live in poorly insulated homes and densely populated residential areas with few green spaces, and are therefore particularly affected by heat and particulate matter pollution (Striessnig et al. 2022). People with a low socio-economic status are also more frequently directly exposed to extreme weather events and often have fewer resources and capacities to cope with them (Butsch et al. 2023). We therefore assume that people with low incomes will feel more threatened by climate change and its financial consequences than those with high incomes.

On the other hand, low-income groups have a lower level of environmental awareness and are less concerned with climate change. This is partly attributed to possible additional constraints to time and finances faced by this group, meaning that they have comparatively little time and resources to deal with climate change while coping with everyday life (Striessnig et al. 2022).

Furthermore, threat perception could be related to educational resources. A higher level of education is likely to be associated with greater knowledge of climate change and its consequences. One study found that people with a low level of education were less aware of the problem of climate change on average than people with a high or medium level of education (Lübke 2021).

Another relevant factor for differences in the perception of climate change could be health. Heat, in particular, has been shown to exacerbate existing complaints such as cardiovascular, respiratory or kidney diseases, and medications can cause serious side effects in some cases when exposed to heat. People with pre-existing conditions are therefore among the population groups particularly susceptible to heat-related morbidity and mortality (Winklmayr et al. 2023). Extreme weather events also pose a higher risk for people

with health impairments; extreme weather can pose challenges for medical care if supply chains, transport or water and energy supplies are affected (Butsch et al. 2023). We therefore expect that people who rate their health worse will perceive climate change as a greater threat than people who rate their health better.

Research questions

Against this background, this issue of DZA Aktuell analyses the following research questions:

1. To what extent do people in the second half of life perceive climate change as a threat?
2. What differences are there in this respect according to age, gender, income and education?
3. Do people with health restrictions feel more threatened by climate change than people in good health?
4. Do people who have children or grandchildren feel more threatened by climate change than people without children or grandchildren?

To better interpret the perceived threat from climate change, this threat is also compared with the perceived threat from Covid-19 at different times during the pandemic.

Data and methods

The German Ageing Survey (DEAS)

The German Ageing Survey (DEAS) is a nationally representative, cross-sectional and longitudinal survey of people in the second half of life. For more than two decades, the study has regularly surveyed women and men as they move into old age (1996, 2002, 2008, 2011, 2014, 2017, 2020/21 and 2023). This long observation period allows a comprehensive insight into ageing and the living situations of people in the second half of life. In addition, the cohort-sequential design of the study makes it possible to analyse social change in ageing. The DEAS is therefore the central study on age and ageing in Germany. More than 20,000 people have taken part in the study to date. People aged 40 and over at the time of their first participation are surveyed. Participants are selected based on a sample from the residents' registration offices, stratified by age, gender and region. The DEAS data is therefore representative of the German population living in private households in the second half of life.

The most recent wave of data collection took place between December 2022 and June 2023. It focused on questions about the respondents' current living situation, such as social relationships, well-being and employment. In total, 4,992 people aged 43 and over took part in the survey, which was conducted either as a face-to-face or a telephone interview. Following the personal interview, the respondents received an additional self-administered questionnaire, which was answered by 4,211 people in writing or online.

The analyses present weighted proportions and mean values using methods that take into account the complex survey design of the sample. In DEAS 2023, the weights were also post-stratified by education for the first time. Group differences are tested for statistical significance. A significance level of $p < 0.05$ is used. If a finding is statistically significant, it can be assumed with at least a 95 per cent probability that a difference found exists not only in the sample in question, but also in the population as a whole. If a finding is not statistically significant, it is possible that the differences observed in the sample were only due to chance.

DEAS is funded by the Federal Ministry for Education, Family Affairs, Senior Citizens, Women and Youth (BMBFSFJ).

Further information on DEAS can be found at www.deutscher-alterssurvey.de

To answer the research questions, we used data from the German Ageing Survey (DEAS, (Klaus et al. 2017)) from 2023. This was the first year in which the perceived threat of climate change was surveyed. It was part of the written questionnaire. The analytic sample included the 4,139 people aged 43 and over who completed the drop-off questionnaire and answered the question on the perceived threat posed by the climate crisis.

To make comparisons with the perceived threat posed by Covid-19, we used information from the short, written questionnaire in summer 2020 ($n = 4,800$) and the personal interview in winter 2020/21 ($n = 5,398$).

Variables

The perceived threat of climate change was recorded with the following question: “The following question is about how the climate crisis affects you personally and your environment and how you experience it. To what extent do you perceive the climate crisis as a threat?” Respondents could place themselves on an answer scale from 1 (“no threat at all”) to 10 (“extreme threat”).

Respondents were also able to use the same scale to assess the extent to which they perceived Covid-19 as a threat. The corresponding question in all three survey waves was: “The following question is about how the Covid-19 crisis has affected you personally and your environment and how you experience it. To what extent do you currently perceive the Covid-19 crisis as a threat to yourself?”

Differences in the perceived threat posed by the climate crisis were analysed according to age, gender, income, self-rated health and position in the family generation sequence. Four age groups were distinguished: 43-55 years (31%), 56-65 (31%), 66-75 years (18%), 76 years and older (20%). In terms of gender, we differentiated between men (46%) and women (54%). Three groups were formed regarding financial situation: households at risk of poverty (13%), middle-income households (69%) and higher-income households (18%). People were considered to be at risk of poverty if their net equivalent household income was below 60% of the median income for the population

as a whole. Middle incomes were defined as incomes of 60-150% of the median income. Higher incomes were above 150% of the net equivalent median income. The reference value for the median income of the total population is based on the EU-SILC, which was €2,083 per month (€25,000 per year) in 2022. The at-risk-of-poverty threshold is therefore €1,250 per month and the 150% threshold is €3,125 per month. The highest school-leaving qualification was used to analyse differences in education. A distinction was made between low (maximum “Hauptschule”, 33%), medium (maximum “Realschule”, 36%) and high education (university entrance qualification, 31%). Self-rated health was assessed with the following question: “How would you rate your present state of health?”. The analyses differentiated between three groups: (very) poor (11%), medium (36%) and (very) good (52%). We also differentiated three groups by position in the family generation sequence: people who have neither living children nor grandchildren (16%), people who have children but no grandchildren (40%) and people who have grandchildren (44%).

If people did not provide valid information on individual variables, they were excluded from the respective analyses. This applied to 114 cases (weighted 3.1%) without valid information on income, 3 cases without valid information on school-leaving qualification (weighted 0.1%) and 2 cases (weighted 0.0%) without valid information on self-rated health.

Findings

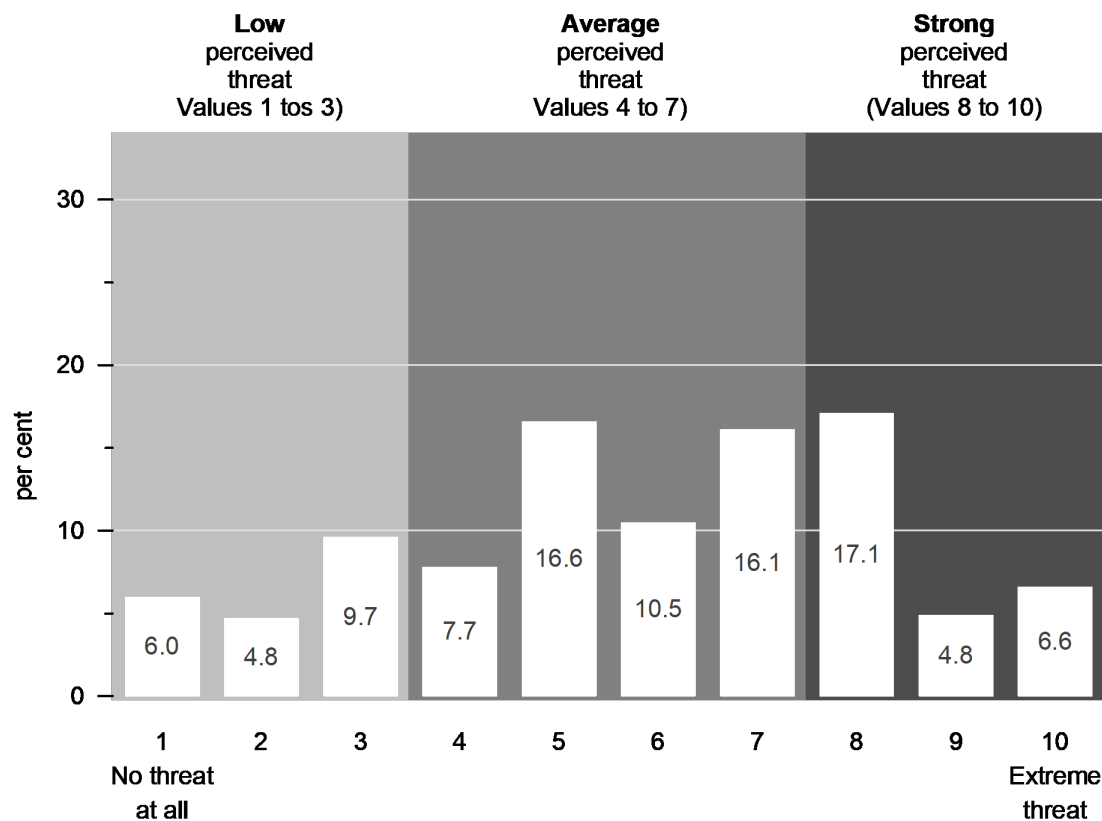
Over one in four people in the second half of life perceived a high threat from the climate crisis

The perceived threat posed by the climate crisis varies greatly. While comparatively few people placed themselves at the extreme values at either end of the scale, values 5, 7 and 8 were chosen most frequently. Respondents therefore tended to categorise

themselves in the upper mid-range (Figure 1).

If the values are divided into three groups, the following picture emerges. While just over one in five people (21%) perceived a low threat (values 1 to 3), over one in four (29%) perceived a high threat (values 8 to 10). Half (51%) rated the threat posed by climate change as medium (values 4 to 7).

Figure 1: Perceived threat from the climate crisis, distribution on a ten-item scale from 1 (no threat at all) to 10 (extreme threat), shares in per cent



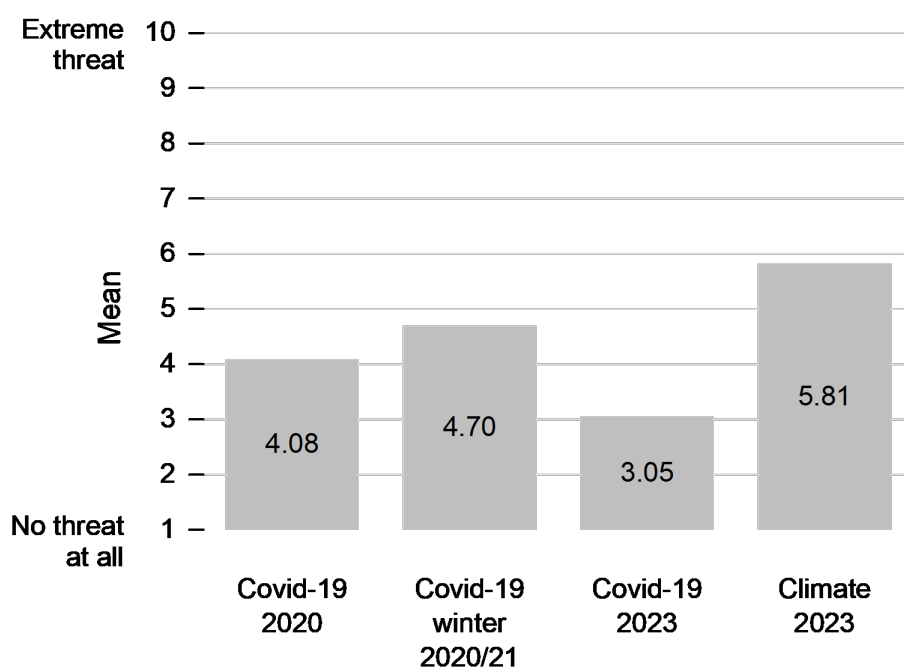
Source: DEAS 2023, Version 1.0 (n = 4,139), weighted, rounded figures.

Climate change is perceived as a much greater threat than Covid-19

The average perceived threat from climate change in 2023 was 5.8 on the ten-point scale. To better categorise this value, it was compared with the perceived threat Covid-19 during and after the pandemic (Figure 2). Climate change was assessed as a significantly greater threat than the pandemic. During the survey period, in April 2023, the last measures in the fight against Covid-19 expired. At this time, the majority of respondents rated the threat posed by Covid-19 as low (average score of 3.1); the perceived threat from Covid-19 at this time

was almost three scale points below the perceived threat from the climate crisis. Even during the Covid-19 pandemic, the perceived threat from Covid-19 was significantly lower than the perceived threat from the climate crisis in 2023. After the first wave of the pandemic in summer 2020, the average perceived threat from Covid-19 was 4.1. In winter 2020/21 – during the second and third wave of the pandemic, when infection numbers peaked and vaccinations and rapid tests were not yet widely available – the average perceived threat from Covid-19 was 4.7, more than one scale point lower than the perceived threat from the climate crisis in 2023.

Figure 2: Perceived threat from the climate crisis compared to the perceived threat from Covid-19 during and after the pandemic, mean values on a scale of 1-10



Source: DEAS summer 2020, version 1.0 (n = 4,800), DEAS winter 2020/21, version 1.1 (n = 5,398), DEAS 2023, Version 1.0 (n = 4,139 for threat from the climate crisis, n = 4,142 for threat from Covid-19), weighted, rounded figures.

Women perceive a greater threat from the climate crisis than men; there are no differences according to age, income and education

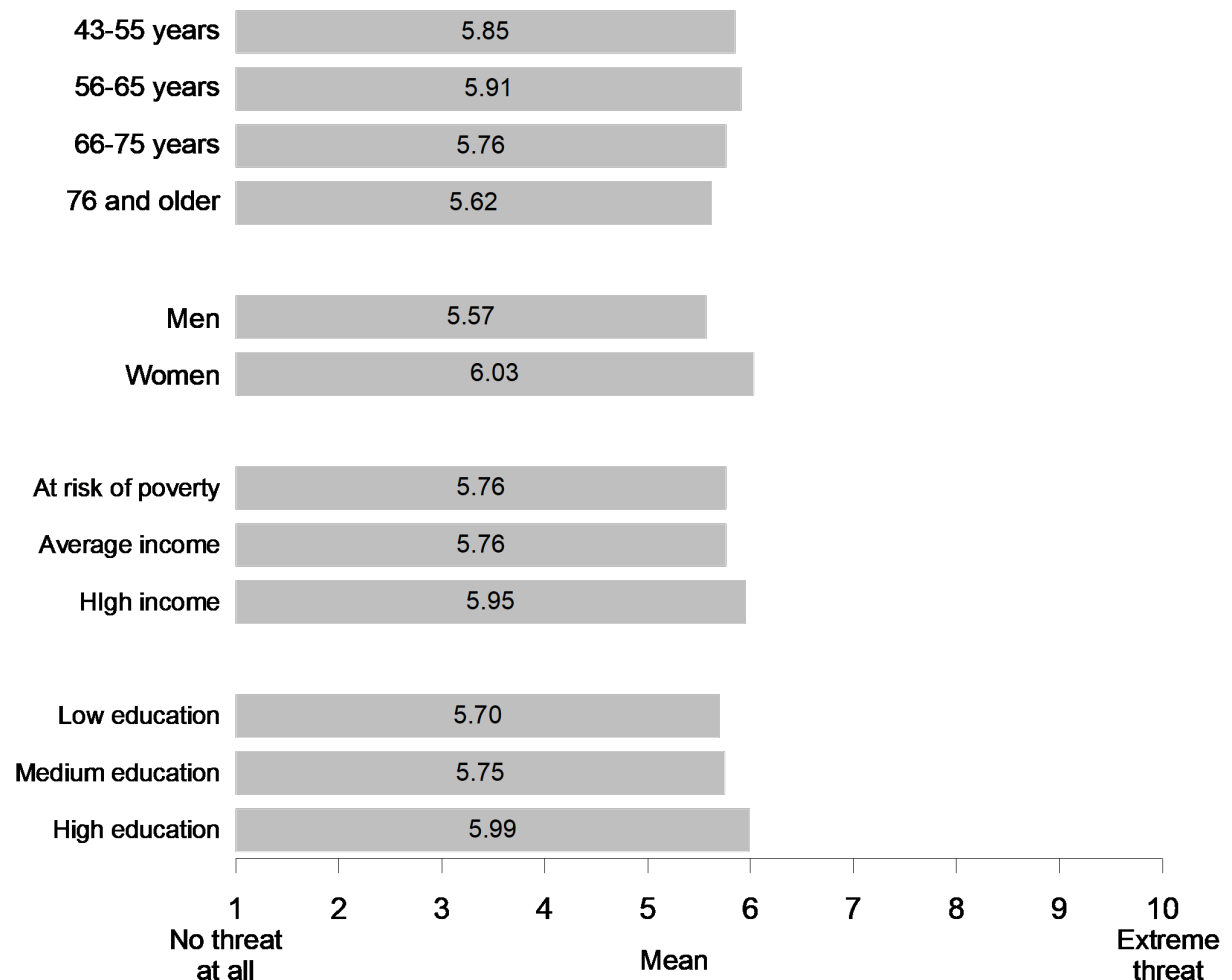
A comparison of the perceived threat posed by the climate crisis by age groups reveals no statistically significant differences (Figure 3). In all four age groups, the perceived threat was between 5.5 and 6 on a scale of 1 to 10. Hence, the data from the German Ageing Survey provide no evidence that older people take the threat of climate change less seriously than people in middle adulthood. We could not investigate to what extent younger adults and adolescents differ from people in the second half of their lives in terms of the perceived threat posed by the climate crisis.

The data also show that women perceive climate change as a greater threat than men.

With an average value of 6.0 on the ten-point scale, the perceived threat for women was around half a scale point higher than for men. This is in line with findings from other studies worldwide, which also show that women are more concerned about climate change than men (Bush & Clayton 2023).

There were no significant differences between income groups. People at risk of poverty felt a similar level of threat from climate change as those on medium or higher incomes. Contrary to our expectations, there was no evidence that those with fewer financial resources available for adapting to climate change are more concerned than those with greater financial resources. Also contrary to our expectations, there are no differences between education groups in the perceived threat posed by the climate crisis.

Figure 3: Perceived threat of the climate crisis by age, gender, income and education, mean values on a scale of 1-10



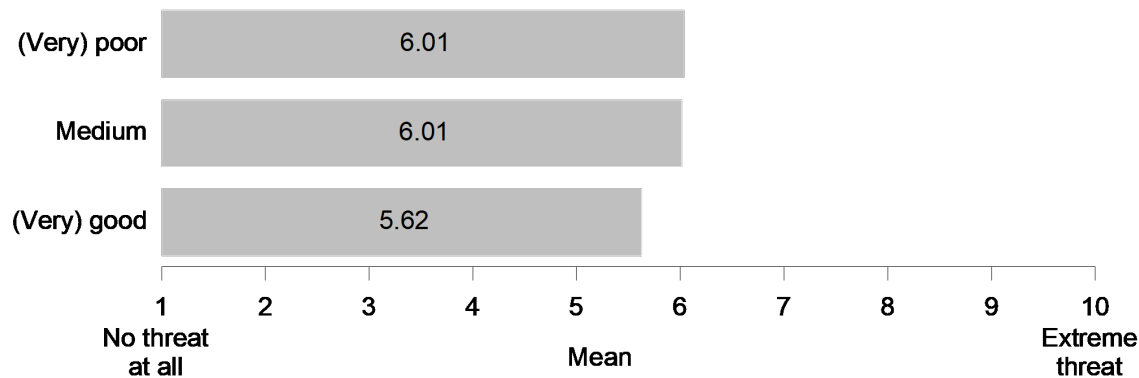
Source: DEAS 2023, Version 1.0 (n = 4,139), weighted, rounded figures. Statistically significant ($p < 0.05$): Difference between men and women.

People with good self-rated health perceive less of a threat from the climate crisis

In terms of self-rated health, people who rated their health as good or very good had a lower perception of threat from the climate crisis (5.6) than people with medium health (6.0) (Figure 4). This difference is statistically significant. People who categorised their state of health as (very) poor also rated the threat posed by climate change as 6.0, but the difference between this rating and that of people with (very) good self-rated health is not statistically significant. This is probably because only a comparatively small proportion of people in the second half of life

rated their state of health as (very) poor, meaning that there is greater statistical uncertainty for this group. Hence, people with (very) good self-rated health tend to perceive climate change as less of a threat than those who rate their state of health as worse, even if this is only statistically confirmed for people with medium self-rated health compared to people with (very) good self-rated health. However, no statistically reliable statements can be made about the threat perception of those who may be particularly vulnerable to heat or extreme weather events due to their poor self-rated health.

Figure 4: Perceived threat from the climate crisis according to self-rated health, mean values on a scale of 1-10



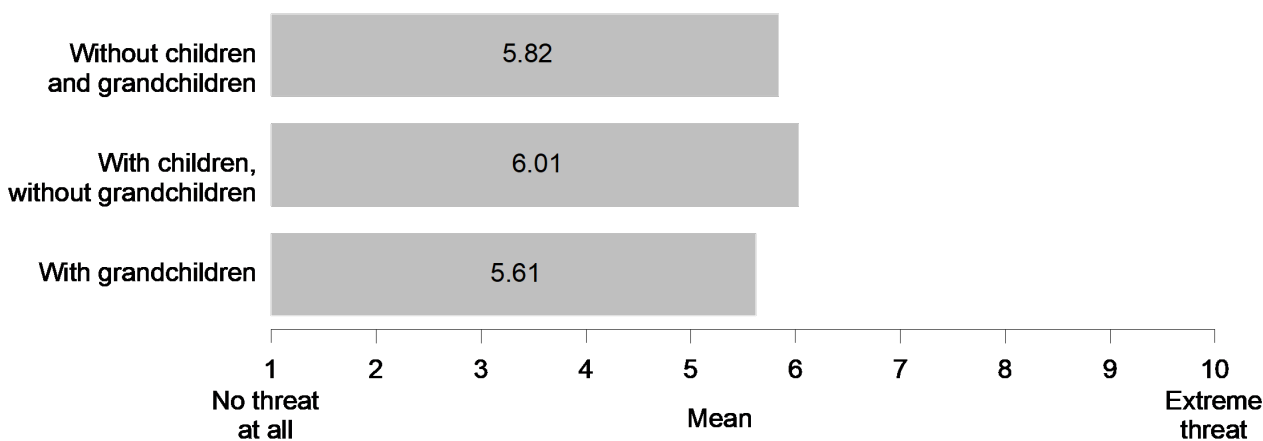
Source: DEAS 2023, Version 1.0 (n = 4,137), weighted, rounded figures. Statistically significant (p<0.05): Difference between people with (very) good and medium self-rated health.

People who have children but no grandchildren perceive a greater threat from the climate crisis than those with grandchildren.

With regard to the position in the family generation sequence, we had expected that people who have children or grandchildren would perceive a comparatively strong threat from climate change, as their children and grandchildren will be affected when the consequences of climate change become increasingly noticeable in the coming decades.

However, people without children rated the threat of climate change similarly to those who have children or grandchildren. Surprisingly, people who have children but no grandchildren (yet) perceived a greater threat from climate change than those who have both children and grandchildren. The difference between the two groups is around half a scale point on the ten-point scale and is statistically significant. In-depth analyses show that this pattern persists after taking into account that people without grandchildren are on average younger than people with grandchildren.

Figure 5: Perceived threat from the climate crisis by position in the family generation sequence, mean values on a scale of 1-10



Source: DEAS 2023, Version 1.0 (n = 4,139), weighted, rounded figures. Statistically significant (p<0.05): Difference between people with children, without grandchildren and people with grandchildren.

Discussion and conclusion

Some of the consequences of climate change, such as periods of heat and drought, flooding and extreme weather events, have already become apparent in recent years. As the climate changes, such events will continue to increase in the future – especially if the global community does not succeed in limiting the temperature increase to 1.5 or at most two degrees Celsius.

Against this background, this edition of DZA Aktuell analysed the extent to which people in the second half of life perceive the climate crisis as a threat. We found that just over one in four people in the second half of life perceived a strong threat from the climate crisis, just over half perceived a medium threat and only around one in five perceived a low threat. Furthermore, the climate crisis was perceived as a significantly greater threat than the Covid-19 pandemic – even at the peak of infection rates in the second and third wave of the pandemic in the winter of 2020/21. Our results are in line with other studies that have found a stable environmental awareness at a relatively high level in recent years, which is particularly pronounced compared to other issues (Gellrich 2021; Lübke 2021; Striessnig et al. 2022).

With regard to which population groups perceive a particularly strong or weak threat from the climate crisis, there were no differences by age in the group of 43 to 90-year-olds. There is therefore no evidence to suggest that older people feel particularly threatened, given they are more vulnerable to stresses associated with heatwaves or extreme weather events, for example. There are also no indications that older people are less sensitised to the risks of climate change than younger people, as is sometimes assumed in the public discourse. It should be noted that the DEAS does not allow for a comparison with young adults or adolescents. In line with other studies (e.g. Lübke 2021), we found that women perceive climate change as a greater threat than men do. The finding that higher educated people

have a greater awareness of climate change than people with lower qualifications cannot be replicated with the DEAS data.

The income situation of the respondents does not play a role in their perception of the climate crisis. We had assumed that poorer people would feel particularly threatened by climate change, as they have fewer resources at their disposal to protect themselves against the consequences. On the other hand, it could also be assumed that poorer people may have more pressing concerns in coping with their everyday lives, and may therefore feel comparatively less threatened by climate change. These two mechanisms could cancel each other out, explaining the lack of differences. It should be noted however, that people with higher incomes have a significantly larger ecological footprint than people with lower incomes, despite a similarly high threat perception; they undertake more long-distance journeys, are more mobile overall and live in larger apartments or houses, which is associated with higher energy consumption (Striessnig et al. 2022). There are also no differences between education groups. This means that the threat posed by climate change is not just an issue for higher-income earners with a higher level of education, but is equally prevalent across all income and education groups.

In the context of self-rated health, we had expected that people with poorer self-rated health would perceive the climate crisis as a greater threat; heat, extreme weather events, air pollution and other climate-related issues could be a greater burden for them than for people with good self-rated health. Indeed, we found a tendency for people with good self-rated health to feel less threatened than those with medium or poor self-rated health, though only the differences between good and medium self-rated health are statistically significant.

With regard to the position in the family generation sequence, we had assumed that

people with children or grandchildren would feel more threatened by climate change, as they also include the remaining lifetime of their children or grandchildren in their assessment. Yet, this was not the case. People without children did not differ in their threat perception from people who had children or grandchildren. However, people with children – but without grandchildren – perceived a significantly greater threat than people with grandchildren.

The presence of grandchildren has not been analysed in any studies that we are aware of. In line with our results, a study by Pokorny (2020) showed that childless people attach a similarly high level of importance to environmental protection as parents (including parents with adult children). Furthermore, Pokorny's study (2020) and a study from the United Kingdom both found that parents of young children showed a comparatively low level of environmental awareness. It was assumed that parents with young children are often particularly challenged in terms of time and finances, and therefore prioritise coping with everyday life and the immediate well-being of their children.

One explanation for our findings could be that grandparents are less concerned about climate change if their children are not. And while the grandchildren of the respondents are predominantly of an age that requires intensive care (Bünning 2022), their own children – even if they do not yet have grandchildren – are predominantly older, so their parents may have more time to think about the future.

Furthermore, children who are concerned about the climate themselves and are committed to climate protection can also

inform their parents about this issue and inspire them to get involved, as an experimental study from the USA showed (Lawson et al. 2019). This is another mechanism that may only take effect once children – or grandchildren – have reached a certain age, are aware of the consequences of climate change themselves and have formed an opinion on the subject. For young people committed to fighting climate change, getting their parents and grandparents on board could be a successful strategy; movements such as 'Parents for Future' and 'Grannies for Future' have arisen, inspired by the Fridays for Future movement. However, further research is needed to conclusively categorise the findings presented in this edition of DZA Aktuell.

Recognising climate change as a threat is likely to be an important prerequisite for supporting political measures to protect the climate. Nevertheless, when interpreting the results, it must be noted that a perceived threat does not necessarily result in a change in personal behaviour. Even if many people in the second half of life perceive climate change as a threat, this does not directly translate into a willingness to reduce their own CO₂ consumption or support political measures to combat climate change. Various studies have shown only a slight correlation between environmental awareness and environmental behaviour (Striessnig et al. 2022; Fairbrother, Johansson Sevä, & Kulin 2019). As well as on attitudes, approval of political measures also depends on the costs associated with the measures, how they are designed in detail, how they are communicated and the extent to which people trust politicians to combat climate change (Fairbrother 2022; Fairbrother et al. 2019; Rückert-John et al. 2013).

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² Compared to the original publication, there have been minor changes in the percentages and mean values. This affects the proportions of men and women within the sample, the weighted proportion of missing values for income (without figure), the distribution of the perceived threat of the climate crisis (Figure 1), the mean value of the perceived threat of the climate crisis overall (Figure 2), for the age groups 43-55 years, 56-65 years, and 76 years and older, all three income groups, people with medium and high education (Figure 3), as well as all groups according to subjective health (Figure 4) and family generation sequence (Figure 5). These changes have no substantive effects on the results.

