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# ‘It’s like getting your car checked’: the social construction of diabetes risk among participants in a population study

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In western industrialised societies, asymptomatic individuals are increasingly labelled as at-risk of future illness and targeted for public health interventions. These at-risk people are identified through health checks, population studies and national screening programs. The main purpose of communicating such risk to individuals is to motivate them to make lifestyle changes. Many of these risk-labels are controversial, both medically and ethically. Based on the relational theory of risk and a thematic analysis of qualitative interviews, we explore how individuals defined as at-risk perceive and conceptualise information about risk of developing diabetes. The interviews were conducted in 2019 with 26 participants from an ongoing population study in Norway. After participating within the screening, participants were informed that they had elevated or intermediate glycated haemoglobin values, and therefore at risk of developing type 2 diabetes. Our data reveal an ambiguous situation: while receiving information about being at-risk may function as a vulnerability-reminder that might motivate lifestyle changes, it can also create unnecessary fear over a disease that may never occur. Danger and uncertainty were interrelated aspects in the ways in which our participants conceptualised risk. Participants risk perceptions seemed to be regulated by fear, followed by a need for reassurance. Differences in risk perceptions and accounts of lifestyle changes depended on people’s trust in expert information versus their own experiences. Trust in medical expertise played a significant role in the ways in which participants constructed their risk, as well as their accounts of lifestyle changes.

**Keywords:** risk communication; risk perception; pre-diabetes; labelling; reassurance

## Introduction

The main purpose of communicating health-risks to individuals is to motivate them to make well-informed ‘healthy choices’ (Boholm & Corvellec, 2014; Hansen et al., 2016), and thereby improve the health of the population (Alaszewski, 2010). Health promotion has a strong presence in society which raises concerns regarding its political, social, and moral consequences (Guttman, 2017). Critics are concerned that communicating risk and labelling people with a pre-disease could induce unnecessary harm (Guttman, 2017; Nguyen et al., 2018). Exploring these aspects within risk politics can provide valuable inputs to ethical considerations regarding current public health policy.

Several organisations are promoting ‘pre-diabetes awareness’ and major resources are spent on preventive interventions (Nguyen et al., 2018). However, less attention has

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been directed to how people perceive risk labels. There is some research on the impact of receiving a pre-diabetic label and how it affects accounts of health-related lifestyles. Still, there is limited sociocultural research in this field (Barry et al., 2018).

In this study, we qualitatively explore the social construction of risk among people who have been labelled at-risk of diabetes after participating in a population study. Building on the relational theory of risk, we explore the multiple layers of 'risk objects' and 'objects at risk' in their risk perceptions. Our aim is to understand our participant's perceptions of – and responses to – the risk information, and how this affects their motivation for lifestyle-changes. Whether screening practices that communicate risk of diabetes promote health or induce unnecessary harm is a key question in our discussion.

## Communicating and conceptualising risk and the new label of pre-diabetes

Screening and preventive health checks are increasingly identifying new adverse health behaviours and risk factors (Broholm-Jørgensen et al., 2019). Health institutions are monitoring what counts as proper information and knowledge, and the language of risk is strategically formed to promote healthy lifestyles (Douglas, 2002; Petersen & Wilkinson, 2008). A new medical entity emerges, the at-risk label, which constantly reminds us about our vulnerability (Skolbekken, 2008). Consequently, health promotion communication could have a substantial effect on cultural aspects of society by, for instance, idealising certain lifestyles or turning health into a predominant value. Furthermore, the emphasis on personal responsibility places the burden of being healthy solely on the individual (Guttman, 2017).

Diabetes is a chronic health condition caused by insufficient levels of insulin in the body, which leads to too much blood-sugar in the bloodstream. Over time, this can cause serious health problems, such as cardiovascular diseases, kidney problems and loss of vision. The label 'pre-diabetes' has been constructed to identify individuals with abnormal blood-tests that have not reached diabetic thresholds (Barry et al., 2018). These individuals are an example of an at-risk group that has become the focus of interventions (Hindhede, 2014). Pre-diabetics will typically not experience signs of illness and some never develop the disease (Yudkin & Montori, 2014). Information about pre-diabetes may increase motivation for changing one's lifestyle, but it could also cause anxiety over a disease that may never occur, because 'prediction, however reliable in the aggregate, is notoriously uncertain at the local or individual level' (Montgomery-Hunter, 1991, p. 28). Experts frequently disagree on risk predictions, and at-risk groups are often defined by varying cut-off levels (Barry et al., 2017). Risk communication is often characterised by a controversy over whether something should be considered a risk or not (Boholm & Corvellec, 2014).

Tactics and strategies in risk communication involve strategic decisions regarding which population should be the target of an intervention, and what kind of persuasive arguments are ethically appropriate and practically possible (Guttman, 2017). The increasing prevalence of type 2 diabetes has been attributed to both rising rates of sedentary lifestyle and genetic susceptibility, with the precise interplay between these factors remaining uncertain (Forouhi & Wareham, 2014). This element of uncertainty makes the case of pre-diabetes appealing for risk studies. We chose risk of diabetes as a case mainly because, from a sociological perspective, it can be considered an easy target for human control. Risk status can be easily measured, calculated, and be made subject to manipulation (Skolbekken, 2008).

Biomedical researchers have explored the impact of a pre-diabetes label on health-related lifestyle-changes, but without acknowledging the cultural aspects (Barry et al., 2018). There is limited sociological research on risk labelling (Lupton, 2006). Research that neglects the cultural perspective often leads to a conclusion of a need for improved information for the misguided public (Douglas, 2002). A sociological perspective could enable a greater understanding of why people respond and behave the way they do, in a socio-cultural context (Barry et al., 2018). To our knowledge, no other study has explored perceptions of risk of diabetes in the setting of a population study.

Risk communication often focuses on how information can be improved to inform the public of preventive health issues. The lack of consideration of differences between expert, cultural and individual perspectives often result in ineffective preventive initiatives. To acknowledge individual and cultural perspectives within risk communication, risk should be explored as a subjective phenomenon (Alaszewski, 2010). Various theoretical approaches to risk have revealed the complex cultures in which risk are being debated (Douglas, 2002). To understand how participants perceive risk messages, and to what extent and in what ways public health initiatives promote health and induces unnecessary harm, it is important to explore the sociocultural context of risk communication. This is what the relational theory of risk (Hilgartner, 1992) is designed for.

## The relational theory of risk

Risk is the potential for undesirable consequences in the future (Aven & Thekdi, 2021). The potentiality points to uncertainty, which is a key element here. Although uncertainty does not always involve risk, risk always involves uncertainty (Lian et al., 2021; Zinn, 2009). Perceptions of these uncertainties encompass ‘experiences of wondering, being insecure or worrying about something hypothetical that might or might not be or become’ (Lian et al., 2021, p. 1). Risk sciences provide concepts and tools for exploring how people perceive – and act upon – situations involving risk and uncertainty (Aven & Thekdi, 2021).

Communication is a two-way process, and those who provide and those who receive risk information may have divergent views. Public health information generally build on a one-dimensional bio-medical health-concept and a rational model of risk communication, where people are assumed to be rational actors who utilise risk information to reduce the probability of future undesirable consequences, in this case: harming their health. Within this model, risk is seen as ‘something objective, measurable and located outside the embodied human experience’ (Kriger, 2021, p. 143). Risk perceptions are culturally contingent, and the role of culture in shaping people’s perceptions of risk is often overlooked in epidemiological risk communication. Although risk perceptions are individual assessments of potential consequences of a perceived threat (Sjöberg et al., 2004), our individual tendencies for perceiving risk information are culturally contingent (Douglas, 2002).

As opposed to the ‘objective’ and artefact-centred expert approach, we explore risk as a socially constructed phenomenon (Alaszewski, 2010), and apply a sociocultural framework to explore how risk is embedded in specific social practices (Boholm & Corvellec, 2011; Christoffersen, 2017: Douglas, 2002; Lupton, 2013). Our main theoretical assumptions derive from the relational theory of risk and danger (Boholm & Corvellec, 2011; Christoffersen, 2017; Hilgartner, 1992). In this framework, risk is conceptualised as involving three elements: 1) an object deemed to pose a risk; 2) a valuable object at risk, and 3) the relationship formed by linking these two (Hilgartner, 1992). In our case, elevated blood-sugar levels represent the main *risk object*. An object at risk must meet two requirements: the person must ascribe value to it and *perceive it as endangered*. Whether something represents a threat or not depends on the eye of the beholder, and the relational theory of risk points to the importance of investigating people's perceptions 'rather than simply trying to inform them about the risk calculations of experts' (Christoffersen, 2017, p. 1233). People choose actions based on their own values, so this knowledge is necessary to understand how people judge and act upon received risk information.

In our study, we discuss how biomedical test results of elevated blood-sugar can be presented as a threatening risk object. A risk object is thus communicated by experts as a mathematically equated probability of developing diabetes. The object at risk, which could be the participant's health, is threatened by the danger of becoming ill. The relationship of risk is constructed by participants risk perceptions. We explore the social construction of risk by investigating how our participants perceived and responded to the received risk information, and how it affected their accounts of health-related lifestyles. To uncover these aspects, we conducted a thematic analysis of interview data from participants in the Tromsø Study who received information about their potential diabetes risk.

## Methodology

Our study participants are recruited via The Tromsø Study, which is an ongoing population-based cohort study in the municipality of Tromsø, North Norway. The Tromsø Study includes seven surveys (from Tromsø 1 in 1974 to Tromsø 7 in 2015–16) to which total birth cohorts and representative population samples were invited. Response rates were high (65–79%), and 45,473 women and men have participated (www.tromsostudy.com).

### *Data material*

To identify people receiving information about their diabetes risk, we sampled participants from the seventh round of the Tromsø Study (Tromsø 7). We included participants who had received additional information about long-term blood-sugar level test results classified as either *intermediate* (HbA1c 6,1–6,4) or *elevated* (HbA1c >6,5); values within the pre-diabetes and diabetes range (Strauss et al., 2015). We refer to these test results as 'risk of diabetes'. The test result was presented in a letter received by post, a few weeks after their participation. The test results included a summary of various health information, as well as information about high HbA1c-levels and a recommendation to consult their GP.

To secure variation in gender, age and HbA1c-levels, we selected participants according to a maximum variation strategy. We wanted a diverse sample of participants to identify patterns across different characteristics (Palinkas et al., 2015). Due to the Tromsø Study's previous response rates, we sent 40 invitation letters, hoping for about 20 participants. This resulted in 14 participants, mostly men with intermediate results. In need of greater diversity, we sent out 21 additional invitations, resulting in a total of 26 participants (11 women and 15 men); 14 in the intermediate group and 12 in the elevated group (see, Table 1). The regional committees for medical and health research ethics (REK) granted approval of the study in July 2018 (REK.1364–2). [Table 1 near here].

Table 1. Participants.

| ID | Gender | Age group | Employment status (self-reported) | HbA1c[1] | Diabetes status |
|---|---|---|---|---|---|
| *Intermediate levels of HbA1c* | | | | | |
| Maya | Woman | 40–50 | Employed, higher education | 6,1 | Low risk |
| Louise | Woman | 40–50 | Employed, higher education | 6,1 | Low risk |
| Scott | Man | 40–50 | Employed, higher education | 6,1 | Low risk |
| Isabella | Woman | 50–60 | Employed, higher education | 6,1 | Low risk |
| Taylor | Woman | 50–60 | NA | 6,1 | Low risk |
| Paul | Man | 70–80 | Retired | 6,1 | Low risk |
| Aiden | Man | 80–90 | Retired | 6,1 | Low risk |
| Martha | Woman | 50–60 | Employed | 6,2 | Low risk |
| Sam | Man | 50–60 | Employed | 6,2 | Low risk |
| Allan | Man | 50–60 | Employed, higher education | 6,2 | Low risk |
| Ava | Woman | 70–80 | Retired | 6,2 | Low risk |
| Fred | Man | 60–70 | Partly retired, higher education | 6,3 | Low risk |
| Harry | Man | 60–70 | Retired | 6,3 | Low risk |
| Mathew | Man | 70–80 | Retired | 6,3 | Low risk |
| *Elevated levels of HbA1c* | | | | | |
| Lisa | Woman | 50–60 | Employed, higher education | 6,5 | High Risk |
| Sabrina | Woman | 60–70 | Employed | 6,5 | T2DM[2] |
| Ethan | Man | 40–50 | Employed, higher education | 6,6 | High risk |
| Karl | Man | 50–60 | Employed | 6,6 | High risk |
| Brittany | Woman | 50–60 | Employed | 6,6 | High risk |
| Rita | Woman | 50–60 | Disability benefits | 7,0 | High risk |
| Jim | Man | 60–70 | Employed | 7,3 | T2DM[2] |
| Eric | Man | 40–50 | Employed, higher education | 7,7 | T2DM[2] |
| Tom | Man | 40–50 | Employed, higher education | 8,0 | T2DM[2] |
| Anthony | Man | 60–70 | Employed | 8,4 | T2DM[2] |
| Hannah | Woman | 40–50 | Employed, higher education | 10,6 | T2DM[2] |
| Kim | Man | 40–50 | Employed | 10,9 | T2DM[2] |

[1] Haemoglobin A1c level (long-term blood-sugar level)
[2] Type 2 diabetes mellitus (self-reported)

The interviews were based on a semi-structured interview guide with four main groups of questions: participants' motivation and reasons for participating; general impact of participating in the study on their lives; reactions to test results; and follow-up from GP. The first author conducted the interviews at the University of Tromsø, from September 2018 to January 2019. Each interview lasted on average 37 minutes. We recorded and verbatim transcribed all interviews with pseudonyms. While referring to the test results, we used the same terms as the participants did varying from 'pre-diabetes', 'borderland', 'risk-zone' and 'risk of diabetes'. Some had developed diabetes. However, the focus in this study will be on participants' understandings of the at-risk label.

### *Data analysis*

During the first stage of the data analysis, we thematically coded the interview transcripts, case by case, following a constant comparative method, whereby each new instance of a theme was compared with previous instances to thoroughly elaborate the properties of each theme (Glaser and Strauss, 2017). We started this coding-process with a concept-driven coding-frame with themes from the interview guide (Schreier, 2013), but to allow our analytical focus to develop during the research process we soon moved to a more data-driven approach (Charmaz & Thornberg, 2021). After evaluating and modifying the coding-frame by adding, splitting, merging, and renaming themes (Schreier, 2013), we created a final coding-frame that we applied to the whole dataset. ‘Reassurance’ was a central data-driven category, representing meaning units like ‘Happy it was not a more serious disease’. During the main analysing phase, the whole material was double coded. We returned to the raw data to reflect on the initial analysis, and all interviews were re-read (Erlingson & Brysiewicz, 2017). After coding all interviews, we systematically divided the raw data-material into meaning units (Schreier, 2013); transferred data-extracts to a cross-table (Erlingson & Brysiewicz, 2017) and identified patterns by searching for convergence and divergence.

## Findings

Each participant has a unique story, but the ways in which they describe their experiences are patterned. Three observed patterns are particularly relevant for our research questions: The significance of screening, the impact of a risk label, and the ability to respond. In the following section, we explore these themes in detail.

### *The significance of screening*

After participating in the population study, most participants felt they had had a thorough health check that could reveal their health-status. When they talked about it, they talked about themselves not primarily as study participants, but as individuals who had received a medical examination:

> Hannah: (…) it was a medical examination, where you tested everything or at least you got a very thorough examination, in my experience. So, you are kind of excited when you are told the results.

Participants also had an impression that asymptomatic illness could be found during the offered examination:

> Rita: (…) the Tromsø Study is really one of the best things ever, because so much illness is detected by the Tromsø Study that they don’t find in normal doctors’ surgeries, because you’re ahead of them and find signals and symptoms, so therefore (laughs), yeah.

According to participants, the technology of screening ‘reveals’ health information which is not otherwise available to them. The elevated blood-sugar is perceived as a risk of disease, this construction links an unknown threat to their health. Several participants described receiving this ‘detected’ information as useful in terms of helping them to take preventive action:

> Fred: (…) it was reassuring in the sense that all my poor scores, meaning some excess weight, blood-sugar, and cholesterol, were all factors that I could do something about, all those were things that I really felt that I could do something about, so it sort of justified my participation in the study, because I sort of felt that I was heading in the wrong direction.

Although Fred already knew he was ‘heading in the wrong direction’, he described receiving the elevated blood-sugar as a useful authoritative encouragement to change his lifestyle to control the threat constructed by the risk relationship. Several participants expressed similar views:

> Kim: (. . .) one should take action oneself when one has this condition, meaning that it's all up to you, your personal willingness to do something about it. So, I think that it's sort of like the EU roadworthiness test for a car, and you receive feedback that you need to do something, so yeah.

Kim explained how the risk information initiated a feeling of responsibility for maintaining his health. Many participants compared the test results with getting a report from having your car checked: it was an audit of the 'the state' of their body and it told them what they ought to do in order to preserve or to fix it. The biomedical fundamentals of the risk relationship could elicit these kinds of views on health maintenance.

> Tom: Sure, absolutely, it was a strong motivation to take better care of my health, because it turns out that the body is not indestructible, is it? So, if you want to keep it, you better take care of it, then.

Tom talked about how the test result made him motivated to live healthier. The risk relationship posed a harm that reminded him that his health is vulnerable and that his body needs maintenance. Several participants described how they interpreted the return letter. It reminded them that 'something that should be done':

> Maya: (. . .) when I read what was written in the test results about diabetes, I had one of those, shit, now it's about time moments. I need to do something about my life (laughs), I did it, I got a kick in the backside, to put it like that (. . .) Yeah, because I'm thinking, if this thing hadn't been detected, then I wouldn't have had any reason to address it myself (. . .), nor would I have and so on, so it really spurred me into action.

Maya explained how the test results made her act and reflect upon her life. Several participants described similar thoughts of getting a 'push' or a 'kick', resulting in accounts of lifestyle changes. However, they also felt reassured:

> Mathew: (. . .) when you get a message indicating that there is really nothing seriously wrong, some serious disease, it's clear that it has a positive effect on your mental health, it is actually kind of reassuring (. . .) I was very happy to have it all made clear, very reassuring, because otherwise there was nothing, there was really nothing alarming in that letter, just a declaration that things are reasonably okay (laughs).

Mathew explained how the feedback could function as a confirmation or acceptance of his lifestyle. Several participants described a sense of relief in knowing their test results in a similar way to Mathew, and that the results served as a reassurance that they were healthy. Similarly, Karl expressed a great deal of trust in the medical examination and described how this information had a positive effect on his quality of life:

> Karl: I believe that both well-being and quality of life, if you're told that there is nothing wrong with you, that this is where you are, then I believe that, like I said before, that when you're participating in something and making yourself available, then it's nice to have feedback saying that you'll live for some years more. And then there's your quality of life, and if you know you've gone through it and there's nothing wrong, it does improve your quality of life and your happiness, it does (. . .).

The participants felt relieved and reassured. This could be an expression of their trust in the biomedical technology as an authoritative measure of good health and potential harms. However, these potential harms are only detectable through advanced medical technology. Participating in a screening is therefore necessary to gain access to information about asymptomatic illness or potential risk relations.

### *The impact of a risk label*

Study participants described their initial reactions to receiving information about the risk object(s) in various ways. Some described it as relatively undramatic.

> Martha: I thought, oh, okay, I need to have this checked out, nothing sort of negative in that sense, I didn't think so, no (…).

As Martha implied, all participants were recommended to consult their GP concerning the results. In this way, the linkage between elevated blood-sugar and the participants' assumptions about prevention, was constructed.

Some participants were not surprised by the result, because they already anticipated their risk of diabetes due to factors such as overweight and heredity. The risk object did not alter these participants' perceptions of risk in major ways.

> Mathew: Well, then, of course I have known all along that I'm kind of in a risk group for diabetes, because I'm a little too heavy and I don't exercise enough and all that, I know that, so I'm not surprised to see this (…).

Others had stronger reactions, mainly participants with levels in the lower pre-diabetes range. They recalled experiencing emotions of fear when receiving the test results.

> Maya: (…) There are very many things, very many things that I dread with regard to that diagnosis of diabetes, the diagnosis in itself is not dangerous if it can be treated, and, when I see how difficult it all becomes, you need to have insulin with you all the time and in general, yeah, I'm terrified of the whole disease (laughs), I don't want it, I tell you, I don't want it, let someone else take it, I don't want it.

These participants construct risk as a putative harm and describe several risk objects related to the test results. Among the 'very many things' she dreads is having to inject insulin, but probably also her way of life more generally. Some male participants, however, did not follow the recommendation to consult their GP.

> Allan: Well, again it's because I don't feel ill, I have no symptoms that … I have no health problems, to put it like that, I sleep well, I have lots of energy. I have little sense of being ill, so then, I could of course have talked to my GP and received some dietary advice, sure (…).

Allan did not follow the recommendation because he perceived himself to be healthy, not sick. Like several other participants, he challenged the existence of the risk linkage (Hilgartner, 1992) by reconfiguring it as not threatening, and therefore carried on with his life as before. Those who challenged the existence of risk valued their own bodily perceptions over the test result of elevated blood-sugar.

> Harry: Well, no, it can't be all that serious, I don't know, I don't think so, since I can't feel it directly myself (. . .)

These participants did not perceive the risk object (elevated blood sugar levels) as posing a serious harm to their health and thus the linkage to lifestyle was not constructed. Like Harry, some participants did not judge their own health conditions as very serious. They only occasionally perceived the seriousness of their condition.

> Brittany: No, I can't say that I go around thinking about it, because I don't, but it's clear that, it is, I don't think about it like that, because I don't, but of course every now and then, meaning now, yeah, that is to say, I do know that the risk is hanging in the air somewhere, but it's not like it bothers me day to day (. . .).

Brittany did not experience any negative impact in her daily life. Participants typically did not experience much anxiety considering a pre-diabetic label. However, most expressed a concern or fear of having to start medication.

> Fred: No, I was scared (long pause) really because I don't use medication, and I didn't want to go on medication, not that I know what diabetes implies, but I know that you need to take your medication every morning, and I didn't want to engage with that.

Fred described how the risk-information poses a threat to his way of life. Like Fred, many participants perceived the need to inject insulin on a regular basis as the main risk object. Isabella describes how her GP had an important role in reassuring her that she had nothing to worry about.

> Isabella: (. . .) Yeah, then I would say that I have been reassured that there is nothing to worry about as things stand, and that's really what I relate to.

The consultation with her GP made Isabella more at ease with the results. This illustrates participants trust in medical expertise. Similarly, Brittany received advice concerning lifestyle changes that could help prevent a potential onset of the disease.

> Brittany: Well, I'm thinking, we did talk about it [blood-sugar values], but he says that as long as it's not above 6.5 he doesn't want to start any sort of huge examination, and he said that I could do things myself, meaning exercise, diet-related things, and those are the sort of things you know when you have a mother who has had it [diabetes] for more than fifty years, so I know what she ate and what she shouldn't eat.

Reassurance was thus reinforced in a conversation about how to control the risk object, and the link between the harmful 'lifestyle' and the object of 'elevated blood-sugar' was in this way established. The relationship of risk functions as a medically induced encouragement to engage in responsible lifestyle changes.

### *The ability to respond*

Those who did not challenge the risk-definitions provided to them through the information they received about their glucose-level, but accepted it as a putative harm, linked the risk in turn to sedentary lifestyles. The younger participants described how the risk information affected their decision-making about health promotion, such as their diet habits.

> Lisa: I have a completely different diet, I have none of these fast-release carbohydrates, I have no sugar and chocolate, there are no such things in my house (…).

While some described increasing their intake of vegetables and fruit and decreasing the intake of sugar and wheat-based food, others gave accounts of increasing their level of physical activity.

> Tom: (…) I must say, the first thing I did was to find my old skis to prepare them and get out in the floodlit ski trails (…) so I did get to see a lot of beautiful northern lights that winter (laughs) (…).

The results also had an impact on other aspects of the participants' lifestyle, which they increasingly monitored by some kind of self-surveillance. Some described how they began to use health services, medical devices, and medical tests in a different way. They either self-administered these health measures or relied on their GPs.

> Brittany: Yeah, so I have been and sort of checked it [blood-sugar] a couple of times lately, after that letter came, and I've focused a little more on it (laughs).

When asked about treatment and follow-up, she explained.

> Brittany: Yes, I have, he [the GP] is keen on following up and measuring my long-term blood-sugar at regular intervals, so that I have, that is if I have felt some discomfort or anything, I ask if they can check it. Then they have done it, and they have done that with this daily blood, short-term blood-sugar, and if I've been to see the doctor for something else, then I´ve asked whether they could check the blood-sugar, and they have been glad to do it, so it's quite okay.

Brittany decided to monitor her own blood-sugar, by regularly asking the GP to perform the test required. For Isabella, symptoms made her revisit her GP to be reassured that everything was fine.

> Isabella: (…) then once I got this eye condition called floaters. It came suddenly, and then, then the alarm bells start ringing, you know, eyes and diabetes and such. But when I spoke with the doctor when I was there last, it was mentioned only as an aside that they couldn't find the measurements that I had taken. This happened about a year ago when I was there. Then I got worried again because that doctor said that when I reached 5.7 … ….. and then she said that this is nothing to worry about (…).

While some participants increasingly consulted their GPs, others monitored their blood-sugar regularly themselves.

> Maya: Because what happened when I had been to my GP and he said, yeah, it's too high, and then like I said I have a friend who has diabetes and I got a machine with needles and all that she hadn't used (…) so I measured my blood-sugar every day (…) for several months (…) to see if there were any changes, and it fell quickly. I was as low as 4.7, but I could feel that this was too low, and I thought, ouch, this was not where I should be. I shouldn't go to the other extreme, but mostly it has been, around, well, five.

Maya described some challenges in her efforts to control the risk relationship herself. Lisa also described some challenges in her decision-making and a lack of follow-up.

> Lisa: Well, what I did, you do reflect on it, but it was a problem that wasn't unknown to me. So, I started reading up a little and thinking, and now after I have been to see the doctor and talked about losing weight, yeah, you can always push yourself to lose those kilos, but you're supposed to keep the weight off, and with no follow-up I found it difficult, because for as long as you don't have diabetes you don't get that follow-up. So, I have had to buy one of those blood-sugar meters myself – and it's really expensive before you get it on prescription – to pay a little attention to matters of diet, and it's only these last six months, through the corporate health service, that I have received some help to succeed in breaking that code.

Lisa felt encouraged by seeking medical attention and by the conversations she had with health professionals. It was implied to her that the harm of the risk relationship is preventable. Participants described the risk relationship as a threat that could be controlled by health maintenance and preventive initiatives. The responsible behaviour was to make decisions about health-related behaviour that controlled and restrained the risk relationship.

## Discussion

### *Constraints and limitations*

Because we sent the interview invitations in collaboration with the administration of the Tromsø Study, participants might have got the impression that we represented the Tromsø Study, which could have affected the participant's responses towards positivity. To avoid such bias, we emphasised that this was an independent study, both in the invitations and during the interviews. We performed the interviews 24–36 months after the participation in the Tromsø Study, and this delay might have limited their recollection of their initial reaction to the risk results. Although several participants reported little anxiety concerning a risk label, most of them had consulted their GP and perhaps been reassured about any initial worries they might have had. If we had performed the interviews before the participants consulted their GP, our findings might have been different. Still, the delay could have a positive effect on the type of information that we received in the sense that we could uncover more valuable knowledge about long-term perceptions of a risk label and the accounts of actions that emerged from such perceptions as these developed over time.

### *Responsibility and reassurance*

By applying the relational theory of risk, we have seen how information about elevated blood-sugar is constructed as a risk that might threaten the health of the population study participants. This framing forms a specific linkage between illness and lifestyle through the assumption that an unhealthy (sedentary) lifestyle increases the probability of developing diabetes. Our data illustrate how this linkage is further bound to action by participant's accounts of decisions to act (Boholm & Corvellec, 2011). This is an example of how health promoting risk-messages strategically frame the notion of responsibility for a disease as if it was primarily under people´s control (Guttman, 2017). However, to understand peoples' risk perceptions we need to consider the complex aspects of danger and uncertainty in risk communication. Risk-messages seem to appeal to people's vulnerability by triggering certain emotions, creating new responsibilities and an overall emphasis on health as a value. These aspects raise several ethical concerns regarding public health policy.

In our study, participating in the population study was compared with 'getting your car checked'. The participants had the impression that everything was being checked, and asymptomatic illness thereby discovered. Consequently, participating in a screening induced positive emotions of relief and reassurance. These findings are consistent with a study where participants believed that a health check was a benign activity that could detect hidden risks (Broholm-Jørgensen et al., 2019). The relief of reassurance could be due to a gratefulness of being informed about the 'unknown unknowns', which are potential harms we did not know about (Christoffersen, 2017). There is always an aspect of uncertainty related to risk when information resulting from scientific technology involve unknown danger (Sjöberg et al., 2004). The societal increase in knowledge and possibilities results in a general shift from danger to risk. Consequently, all responsibilities are placed upon the individual, which raises ethical concerns of attributing blame (Christoffersen, 2017). In a complex attempt to reduce uncertainty, risk has become a new way of talking about dangers (Douglas, 2002).

In an individualistic and rationalistic culture, self-interests are assumed to be the primary motive for behaviour changes (Douglas, 2002). When individuals are labelled pre-diabetic, they are expected to take action to reduce their risk (Barry et al., 2018). This cultural endorsement is captured in our data, as many participants gave accounts of lifestyle changes. As such, participating in the social practice of screening and receiving information about individual risk was perceived as an encouragement to act responsibly. Kolb et al. (2014) also found that people were aware of their diabetes risk and felt responsible for preventing the disease. People engaged in preventive behaviour strive to gain some certainty about their future (Lupton, 2006). However, the motivational force should be further explored.

As in our study, Hindhede (2014) found that behavioural change in pre-diabetics was motivated by a fear of disease and treatment. When elevated blood-sugar is linked to a sedentary lifestyle, it tells people that they are causing harm to their own health (Thomas et al., 2017). This way of communicating the harm as a risk rather than danger causes a shift in the political responsibility for increases in the prevalence of diabetes. By directing attention to the elevated blood-sugar and lifestyle as the central risk relationship, it deflects attention away from alternative threatening linkages, such as genetics or societal structures (Hilgartner, 1992). This linkage illustrates how the language of risk has moral and political implications (Douglas, 2002).

### *Attitudes towards expert knowledge*

Participants who gave accounts of lifestyle changes were strongly embedded in a biomedical and rational model of risk. Participants who consulted their GP talked of the elevated blood-sugar as an authoritative measure of health, and displayed a significant trust in medical expertise. The biomedical construction of risk was central to their decision-making, and their accounts of changes in health-related behaviour were described as motivated by a biomedical threat: the risk object of elevated blood sugar. As such, our findings support Boholm & Corvellec's (2011) notion that trust plays a significant role in the construction of risk relationships. Trust-based risk relationships, which might involve medical knowledge in general or a trusted doctor, are likely to have an impact on people's risk perceptions, and thereby also their accounts of actions (Corvellec, 2011). However, because of the power-imbalance between doctors and patients, it is not easy to separate trust from power, and '[o]ne person's trust can become another person's power base' (Grimen, 2009:18).

As our data convey, expert information from medical testing technologies may have a substantial effect on people's risk awareness (Lupton, 2006). Still, the biomedical construction of risk did not seem to influence all participants. Some participants, predominantly men, told that they had not consulted their GP (as requested), and they gave no accounts of lifestyle changes, as they did not have any signs of illness. They described their elevated blood-sugar as less important than their own bodily perceptions, and thereby challenged the existence of the risk relationship (Hilgartner, 1992). Their rejection of the risk object and reconfiguring of the risk relationship could be due to a mistrust in expert knowledge. Health information can be contradicting and changeable, and benefits of adopting recommended practices invokes uncertainty when scientific backing for health advices are uncertain (Alaszewski, 2009; Guttman, 2017). However, the biomedical uncertainty is not the sole issue here, and health might not be the only thing people value. Rejecting the risk object might be an expression of how participants value health in relation to their other values.

Our findings indicate that the ways in which participants constructed the received risk information are connected to different attitudes towards expert knowledge, and different ways of weighing experiential versus expert knowledge. Those who accepted the risk-information and linked it to a putative harm described how it motivated them to make lifestyle changes. Those who denied or reconfigured the risk-relationship did not. This illustrates that risk does not exist *ex nihilo*, but is created through a situated cognition by people who constructs links between two objects: a risk object and an object at risk (Boholm & Corvellec, 2011; Hilgartner, 1992). Further, our analysis reveals that a presented risk object can inhibit multiple layers of threats depending on what people consider to be at stake. As such, the relational theory of risk helps illuminate the complexity and cultural contingency of risk perceptions.

Furthermore, our findings support Lupton's (2013) assertion that risk is inevitably imbued with emotion. Health promoting strategies often appeal to people's emotions, and as we see in our data: Participants's reactions to diabetes risk after screening were embedded in negative and positive emotions, both fear of treatment and the reassurance of screening. While risk is presented as a calculated probability by experts, it is perceived in terms of emotions and social values by those classified as being at risk. Because risk calculations presented as complex probabilistic equations can be difficult to understand, people are left with the choice of either trusting or distrusting the given information. Changes in people's behaviour therefore strongly depend on trust in those who are communicating it.

Public health managers communicate risk labels as dispassionately rational experts, while they are frequently displaying overtly moralistic judgements (Lupton, 2013). In our study, we have seen how diabetes risks are perceived as an encouragement to act and how motivations are driven by emotional responses. As risk communication aims to influence behaviour related to intimate aspects of people's life, health promotion interventions are often loaded with moral concerns in the sense that they indirectly blame people for their health problems (Guttman, 2017). To strategically elicit emotions of fear from risk communication are widely contested among health promotion practitioners (Lupton, 2013).

## Conclusion

Our study indicates that uncertainty about future health can be lessened by the psychological benefits of reassurance. Reassurance is a therapeutic manoeuvre that is effective in reducing anxiety and providing immediate relief. However, a long-term effect could be a more frequent need for health care services and increased anxiety (Warwick & Salkovskis, 1985). We found that participants used the health services more frequently after screening, which might indicate an increased need for reassurance. People who are made aware of their risk might want the reassurance of screening, and they are likely to engage in other screening activities (Cantor et al., 2002). An overall focus on health-risks may increase the population of ‘the worried well’ (Le Fanu, 1999: xix), and create new demands and expectations for the health care system (Guttman, 2017).

Our analysis addresses an important ethical dilemma of how to promote health without indefensible labelling and blaming of individuals (Douglas, 2002; Guttman, 2017). Researchers should continue to examine risk perception in a sociocultural perspective, and explore the linkages between screening and reassurance. Researchers of risk communication should also be mindful of the ethical issues that health politics evokes. This is especially important in a time when our everyday lives are strongly affected and restrained by the risk of disease imposed by a worldwide epidemic.

The relational theory of risk helps illuminate how screening practice staff present high blood-sugar as a risk object and the emphasis on danger helps disclose the framing language of risk communication. Because the primary cause of diabetes is linked to lifestyle, it evokes a sense of moral obligation for some participants to make lifestyle changes. For many participants, receiving risk messages after contributing to the population study evoked emotional responses of fear and a need for reassurance. This reveals the moral judgements that strategically underpin the seemingly dispassionate framing of health promoting practices. An overall emphasis on individual responsibility and health as a value could contribute to labelling and blaming of new defined at-risk populations. Further, the demand for the appealing psychological benefits of health reassurance is likely to increase, which has the potential to increase people’s long-term health-related worries and concerns, alongside heightening pressures on healthcare services.

There are multiple configurations of risk objects in messages about elevated blood-sugar levels. This includes being dependent on insulin injections, making lifestyle changes and, in a longer-term perspective, risking serious health problems, such as cardiovascular diseases, kidney problems and loss of vision. Some participants perceived the information they received about their blood-sugar levels as a putative threat that they needed to do something about. Others did not. By interpreting our data in relation to the relational theory of risk, we have explored the question of why people perceive the same information differently. We found that those who did not construe the information as a threat referred to their own experiences of not feeling ill. This means that they did not define themselves as vulnerable to the proposed threat, and thereby *not* ’an object at risk’. The observed differences in risk perceptions seems to depend on people’s attitudes towards expert knowledge versus their own experiences. Those who displayed significant trust in medical expertise accepted the risk-object and gave more accounts of lifestyle changes than those who relied on their own experiences.

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