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Effects of the medical investigation Bijlmermeer aviation disaster on health perception of residents and rescue workers

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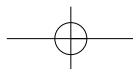
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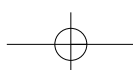
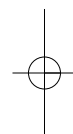
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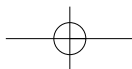
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Chapter 7

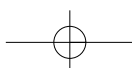
Summary and General discussion





Chapter 7

Summary and General discussion



Introduction

In the years following the Bijlmermeer aviation disaster on October 4th 1992, there was growing concern about the physical and psychological health of the residents and rescue workers exposed to the disaster. Persisting rumours about the cause of the crash, toxic exposure and health consequences led more than eight years later to the Medical Investigation Bijlmermeer Aviation Disaster (Dutch acronym: MOVB). The main intention of this investigation was to reassure the participants about their health and to provide evidence-based information about the consequences of the disaster in general. The MOVB consisted of two main studies: an epidemiological investigation to assess the relationship between health complaints and exposure to the disaster and an individual medical examination for all individuals who considered themselves to be suffering from the consequences of the disaster. On top of these studies an examination of the effects of participation was carried out, specifically assessing a hoped-for decrease in health complaints and worries. This thesis describes the results of this last study.

The first aim of the present study was to investigate whether participation in the individual medical examination or the epidemiological study reduced persistent anxiety about health among residents and rescue workers in varying degrees involved in the Bijlmermeer Aviation Disaster. The second aim was to study the effect of participation on self-reported physical and psychological health complaints. The third aim was to assess which risk factors were related to changes in perception of current health problems. Factors influencing cultural differences in changes in perception of health problems among residents of the Bijlmermeer district were studied separately.

This study was a prospective longitudinal study in both residents and rescue workers assessed at four time points: during the data collection of the epidemiological study and the individual medical examination (baseline), 6 weeks later during the consultation with a physician (post measurement, only in the medical examination), 12 weeks after the first examination (short-term follow-up) and six weeks after communication of the results of the epidemiological study among rescue workers (long-term follow-up), at least one year after baseline.

Summary of results

In Chapter 2 the results are described of a study that tested the hypothesis that a large-scale provision of an individual medical examination will reduce persistent anxiety about health and subjective health complaints after involvement in an aviation disaster with alleged exposure to hazardous chemicals. Changes in health expe-

rience between baseline, consultation (6 weeks) and short-term follow-up (12 weeks) were assessed. Rescue workers and residents reported increased health anxiety and somatic sensitivity after 12 weeks. Residents reported more post-traumatic stress symptoms, whereas rescue workers seem to have gained a better quality of life and were somewhat reassured compared to baseline measurements. Participants who attended the consultation with the physician showed increased reassurance scores after six weeks, but at follow-up their worries had increased again. However, non-attendees reported more health anxiety at follow-up than attendees. Participants more often judged participation to have had a positive than a negative impact on their health.

The study presented in Chapter 3 investigated whether participation in a trauma-focused epidemiological study reduced health complaints and concerns irrespective of trauma exposure. Changes in health experience of rescue workers and residents were assessed between baseline and short-term follow-up (12 weeks). Both rescue workers and residents reported less reassurance, and increased health anxiety and somatic sensitivity 12 weeks after the investigation compared to the first measurement. Exposure to the aviation disaster was not predictive of these changes in health perception, but higher levels of psychological and physical symptoms at baseline were. Only 0.2% to 1.6% of the residents and rescue workers indicated at baseline that the investigation had had a very negative impact on their mental and/ or physical well-being.

The study described in Chapter 4 investigated (a) the effectiveness of providing information on the health consequences of exposure to the aviation disaster to residents and rescue workers with varying degrees of exposure to the disaster and (b) individual characteristics which may moderate the effectiveness of the health information provided. This study assessed the long-term effects among participants of the individual medical examination and the epidemiological study, at least one year after the baseline measurement. All participants reported elevated levels of psychopathology and fatigue, increased anxiety and uncertainties about their health 6 weeks after communication of the results of the epidemiological study, irrespective of the degree of exposure to the disaster. Especially the conviction that health complaints were caused by toxic exposure was related to more severe health complaints and worries in both rescue workers and residents.

The aim of the study reported on in Chapter 5 was to assess which risk factors are related to changes in perception of current health problems after participation in a trauma-focused study among rescue workers and residents in varying degrees involved in an aviation disaster. Prediction of short- and long-term changes was performed among participants of both the individual medical examination and the epidemiological study. The multivariate prediction of the short- and long-term follow-up change scores indicated that especially residents with a low education, non-west-

ern background and higher levels of fatigue at baseline who did not consult the physician to discuss the results of the examination report increased levels of perception of health problems at both measurements. In addition, post-traumatic stress symptoms were predictive of short-term change scores.

In Chapter 6 the results are reported of an investigation of the effect of cultural differences on the short-term effects of participation in the MOVb among residents of the Bijlmermeer district. This study assessed which risk factors and mediators influence differences in changes in health concerns between western and non-western residents who participated in the epidemiological study or the individual medical examination. Previously, we found that non-western participants had an increased perception of current health problems compared to western participants. However, the current study revealed that there were numerous differences between the two groups in baseline characteristics as well as in (research-related) measurements over time. At baseline, high levels of post-traumatic stress symptoms, low education, no paid job and being in the Netherlands for only a short period of time were the only remaining multivariate risk factors of increased levels of perception of health problems three months after the investigation. Being from a western or non-western ethnicity did not add significantly to the regression equation. We also analysed psychological processes that took place during the investigation, which could help to explain the association of ethnicity with changes in perception of current health problems. The predictive value of western/non-western ethnicity for the change score in perception of health problems was mediated mainly by changes in psychopathology, fatigue and quality of life.

Discussion of results

Apparently, participation in the MOVb has had a negative overall effect on residents and rescue workers. Several factors seem important in explaining this adverse effect: the way in which reassurance was provided and communication of the results of the epidemiological study took place, the timing of this investigation more than eight years after the aviation disaster, and individual differences and vulnerabilities among the participants.

Reassurance and communication

The main intention of the MOVb was to reassure the participants about their health and to provide evidence-based information about the consequences of the disaster in general. Of note is that only about 50% of the participants in the individual examination made use of the possibility to discuss the results of their medical examination with the physician. In this subgroup scores for reassurance by medical information

provided by a physician became more positive over time. However, as hypothesised this effect was most pronounced directly after the consultation and already had largely disappeared 6 weeks later. Nevertheless, health anxiety was more manifest at follow-up among participants that did not attend the consultation than among attendees. Taken together, these data suggest that a medical examination in itself may not be very helpful. Without a vis-à-vis consultation, a medical examination may have the same inadvertent negative consequences as participation in an epidemiological study without seeing a physician may have.

The presence of some positive results on reassurance in patients consulting a physician may be interpreted from what is known about the effects of consultations in medical practice. Results of studies in this area indicate that patients with medically unexplained physical symptoms need explanations for their symptoms rather than simple reassurance (Salmon, 2006). Of note is that in the present study medical assistants and physicians were specifically trained in discussing health worries and anxieties and in giving personalised feedback in this particular group of people involved in the disaster. Possibly, the physicians in our study were successful in discussing the results of the medical examinations without reinforcing the opinion that complaints resulted from toxic exposure, while at the same time offering a more convincing alternative explanation (e.g. in terms of stress). Dowrick et al. (2004) showed that effective normalisation of unexplained symptoms includes an explanation with a tangible mechanism, grounded in patients' concerns, often linking physical and psychological factors. Apparently undergoing a medical examination without this personal feedback is not as reassuring in itself.

Medically unexplained symptoms such as fatigue after exposure to war or related events could exacerbate, when the focus of medical care and diagnostics is on identifying objective clinical findings (Clauw et al., 2003). Perhaps the exhaustive diagnostic testing that took place in the Medical Investigation Bijlmermeer Aviation Disaster inadvertently gave the participants with elevated levels of somatic symptoms such as fatigue the impression that the likelihood of a serious undiagnosed disease was high and as such led to a higher perception of current health problems.

Apart from personal feedback in the individual examination, all participants in the MOVb received a public summary of the first results of the epidemiological study. Although no medical sequelae of the disaster among the rescue workers were found, our study results show that the effect of communicating this positive result to the risk group of exposed participants did not differ from that in non-involved participants. These results are consistent with those of previous studies showing that providing general risk information is not very effective compared to more personalised risk communication in influencing key outcomes such as cognitive measures (e.g. knowledge and risk perception), affective measures (e.g. health anxiety and worries) and behavioural measures (e.g. uptake of screening programmes) (Edwards et al., 2006).

Timing of interventions

Other factors could also have negatively influenced the impact of the health information provided to our study participants. One explanation might be the large time-interval between the disaster and communication of the epidemiological findings. In a longitudinal study after an explosion of a fireworks depot, van den Berg, Grievink, Stellato, Yzermans and Lebreton (2005) found a gradual decrease in the number of physical symptoms, although the survivors still reported more symptoms than controls four years after the disaster. They argue that no theories about possible exposure to toxic substances developed in the aftermath of this disaster, because of the reassuring results of the blood and urine samples that were obtained as early as three weeks after the disaster. In the years following the Bijlmermeer aviation disaster particularly the persistence of rumours about the possible toxic cargo of the plane led to a growing unease among the residents of the Bijlmermeer district as well as among the rescue workers involved in the disaster (Boin et al., 2001).

So, in order to prevent chronicity of health complaints after a disaster it seems important to rule out the possibility of toxic exposure in an early stage. However, single session debriefing after psychological trauma was proven to be less effective in reducing PTSD and other symptomatology than not intervening (van Emmerik et al., 2002). Also, these early interventions do not improve natural recovery from psychological trauma. More research is needed into the optimal timing of screening for psychological and physical consequences of disasters.

Individual differences and vulnerabilities

Pre-disaster pathology may have contributed to ineffectiveness of the communication of health information to study participants. In a longitudinal study using medical records of general practitioners after the previously mentioned fireworks disaster, Yzermans et al. (2005) showed that victims with pre-disaster psychological problems were at a greater risk for post-disaster problems than those without and that relocated victims showed an excess of medically unexplained physical symptoms especially in a period of increased media attention. The prevalence of these symptoms tended to increase in the two and a half years following the disaster. Although these findings resemble the increase in health complaints in our study, they are unfortunately not fully comparable since in the present study pre-disaster data were not available.

Because mental disorders occur more frequently in persons from socio-economically deprived urban areas (Reijneveld & Schene, 1998) such as the Bijlmermeer district, it is conceivable that especially in residents pre-disaster levels of psychological problems, aggravated by the disaster and associated feelings of lack of recognition or compensation for losses, have fuelled the illness attribution of health complaints being caused by exposure to toxic substances. It is also possible that the dif-

ference between residents and rescue workers is not due to a difference in pre-disaster factors, but is related to post-trauma factors. Residents who stayed in the area where the disaster took place probably were much longer confronted with the aftermath of the disaster than rescue workers.

The levels of post-traumatic stress symptoms at baseline as well as a worsening of these symptoms over time indicated that non-western participants in particular were (increasingly) bothered by memories of the Bijlmermeer aviation disaster and by other characteristic reactions to the disaster (Van der Ploeg et al., 2004). Although we cannot firmly conclude that these symptoms are actually related to being involved in the disaster (they could have existed already before the disaster), it can not be left unnoted that more residents of non-western origin lived in the struck apartment buildings at the time of the disaster than western residents.

Conclusions

Our study does not indicate that a large-scale medical examination offered after involvement in a disaster has long-lasting reassuring effects, and suggests that such examinations may have counterproductive effects by sensitizing participants for health complaints.

Participation in an epidemiological study of the long-term sequelae of disaster exposure does not lead to strong negative reactions in most of the participants, but may result in an increased perception of somatic sensations, enhancement of health worries and lowered reassurability by physicians, especially in participants with higher levels of psychological and physical symptoms at baseline.

Communication of essentially favourable findings of an epidemiological study on the health consequences of exposure to an aviation disaster among rescue workers did not result in reduction of subjective health complaints or health worries as hoped for by the Parliamentary Inquiry from which came the recommendation to start this epidemiological study. It could even be argued that the execution of the epidemiological study and the communication of its results to residents and rescue workers has inadvertently promoted health complaints and worries even though the aim was to provide reassurance.

As indicated by increased levels of health anxiety and somatic sensitivity and feeling non-reassured by information provided by a physician, participation in a trauma-focused study may cause increased perception of current health problems.

When the level of psychological and physical complaints deteriorates during a medical investigation, participants from non-western origins are especially vulnerable to develop increased perception of their current health problems.

Methodological strengths and limitations of the study

Strengths

To our knowledge our study is unique in investigating the effects of a large-scale provision of a medical examination to people involved in an aviation disaster with alleged exposure to hazardous chemicals and also in investigating the effects of participating in an epidemiological investigation after this disaster. Moreover, we were able to investigate two large groups of rescue workers as well as residents living in the disaster area, and in the epidemiological study to compare subgroups according to their degree of involvement in the disaster.

In addition, this is the first study to use specific standardized instruments to assess relevant aspects of participants' distress in the context of a study on the health effects of trauma exposure. Another strong point of the present study is its prospective design. We were able to predict longer-term effects of participation on two different moments in time. Well over 40% of variance in changes of perception of current health problems on both follow-ups could be explained by demographic and clinical variables at baseline.

Ultimately, although we did not use a control group of non-participants, whether or not participants made use of the consultation with the physician turned out to be a weak independent predictor of participants' perception of current health problems. To assess selection bias we also compared the results of participants and non-participants in our study of the effects of participation (Verschuur et al., 2008a; Verschuur et al., 2008b). Overall, non-participants reported higher levels of physical and psychological complaints than participants at baseline. So, at the most our study results underestimate the effect of participation at baseline.

Limitations

The time-lag of more than eight years between the disaster and the intervention with subsequent data-collection for our study may raise questions concerning the relevance and generalisability of the results. However, health concerns were still very prevalent after this time (Slottje et al., 2005; Witteveen et al., 2007), as has also been previously reported for survivors of (presumed) toxicological disasters (Havenaar & van den Brink, 1997). It may be, however, that the chronicity of the health complaints made them less easily influenced than with an intervention shortly after the disaster, and it remains unknown what the results would have been if the intervention had taken place earlier in time.

Since our study was designed on top of both the epidemiological and individual medical investigations to exclusively examine the effects of participation, it was not possible to introduce a control group of non-participants in those investigations. In the absence of a control group of individuals not participating in a health survey or

participating in a survey in which no personally relevant information is assessed, all observed effects could reflect time trends and regression to the mean. An example of a time trend is increased media attention for the consequences of disasters in case of a new emergency (e.g. the attacks on the World Trade Center in New York took place during our inclusion period). External confounders such as increased media attention could lead to extensive symptom reporting attributed to the disaster (Donker et al., 2002). However, one out of nine symptoms attributed to the disaster by the patients in this last study had already been reported to the GP before the disaster took place. We analysed the possible influence of time trends by dividing baseline measurements in equal time periods during the inclusion period, and found no evidence for systematic changes in scores for anxiety about health or subjective complaints as a result of passage of time. Given the elevated and increasing scores for complaints and concerns at follow-up, regression to the mean is also an unlikely alternative explanation of the present findings. As Norris et al. (2002) showed in a review study among 160 samples of disaster victims, the general rule was for samples to improve as time passed and symptoms predominantly declined, even with two to 15 years between the two measurements. This makes it likely that our study results can be attributed to participation in the medical investigation, particularly because we found differences in outcome between participants that did and did not attend the consultation.

Thirdly, the validity of measurements of trauma exposure after so many years may be questioned, since empirical evidence has shown that retrospective reporting of exposure to trauma may be influenced by the current physical and mental state of a person (McNally, 2003). People suffering from serious psychological complaints unjustly tend to report more exposure to trauma, leading to an inflated association between exposure and outcome. In order to circumvent recall bias we therefore used the place of domicile of the residents as an objective measure of their involvement. Of note is that this measure concurred with self-reports of exposure to trauma. The group of residents who were most involved in the disaster not only reported more trauma exposure but also reported higher levels of post-traumatic stress symptoms, fatigue and somatic sensitivity and less reassurance than the two groups of residents with lower degrees of involvement (cp. Elklit, 2007). These results suggest that our findings regarding changes in health experience in residents involved in varying degrees in the disaster are not critically affected by the operationalisation of involvement in the disaster.

Another limitation is that study participants in the individual medical examination volunteered to have their health checked by a medical doctor. As such, this self-selected group was probably concerned about their health as a result of the disaster. In a recent study it was shown that the police officers who voluntarily underwent the medical examination significantly more often reported health complaints and trau-

matic events than police officers who were invited to participate in an epidemiological study but did not take the medical examination (Huizink et al., 2006). Study results can therefore not be generalized to involved residents or rescue workers in general. It is also possible that factors such as social desirability or litigation issues may have influenced the answers in the epidemiological study. However, although these factors can result in over- or underreporting of health complaints, they are unlikely to influence changes in health problems during a 12 week time period 8 to 10 years after a disaster. Moreover, participants in the epidemiological study were invited to participate by the researchers and did not take part on their own initiative. Hence, they were probably more driven by compassion with the people involved in the disaster than by their own needs.

Finally, at baseline we did not investigate existing attributions concerning toxic exposure or other connections between complaints and the disaster. We can therefore only conclude that at the long-term follow-up the belief in toxic exposure is present, especially among residents, but we cannot detect possible changes in this conviction. However, in the epidemiological study among rescue workers attributions were also measured at baseline (Slottje et al., 2006), showing that 43% to 49% of the rescue workers involved in the disaster with long-term physical complaints somehow attributed these to the disaster and its aftermath. Nevertheless, in that study no explicit questions related to attributions with respect to exposure to toxic substances were asked.

Suggestions for future research

Only those participants who personally discussed the results of their medical examination with a physician remained somewhat reassured. This underscores the potential value of a vis-à-vis consultation after a medical examination. Future studies must be more attentive to communication and interaction patterns between doctors and patients, which should promote a reattribution of symptoms and better tolerance for, or management of, symptoms.

Further controlled studies are needed to investigate the temporal stability of the inadvertent and unobtrusive negative consequences of participation in the MOVb. For instance, a randomised and controlled study design could assess the differences in health effects between participants in an intensive medical and psychological investigation (such as the MOVb) and a less intensive population screening in which only the most relevant physical and psychological complaints are assessed over time. However, it is questionable whether such a randomised design is possible in the emotionally charged aftermath of a disaster.

Future studies must be more attentive to maximizing the effectiveness of health

communication by identifying specific strategies that promote thoughtful information processing. Personalised health information may be more reassuring than general health information (Edwards et al., 2006). The importance of immediate, individualised, and specific (as opposed to delayed, generalised, and global) feedback has also long been recognised in other fields such as behaviour therapy (e.g., Ferster & Skinner, 1957). For health information to have impact on cognition, affect and behaviour individualising of the communication with respect to characteristics such as pre-existing beliefs or individual cognitive styles (such as need for cognitive closure and ability to tolerate ambiguity) seem to be of paramount importance. In a recent study by Brewin et al. (2008) on a screen and treat approach following the 2005 London bombings, the program succeeded in its aim of generating many more referrals of affected individuals than through normal referral channels, by outreach efforts specifically focused on screening and advising directly affected individuals rather than on public education and general counselling.

In addition, it would be interesting to investigate if a large-scale medical examination immediately following a disaster leads to similar health concerns in the short- and long-term. However, negative consequences of screening in the immediate aftermath of a disaster could be the medicalisation of people with a natural attrition of acute stress symptoms. Also, screening the entire group of people involved in a disaster could yield insufficient benefit in terms of health outcome relative to costs (Landelijke Stuurgroep Multidisciplinaire Richtlijnontwikkeling in de GGZ, 2007). Health research in the immediate aftermath of a disaster, however, does make it possible to assess potential toxic exposure, the absence of which could prevent unnecessary concerns about health risks, unjust attribution of health complaints to exposure and claiming of damages because of supposed exposure (Gezondheidsraad, 2006).

As stated by Norris et al. (2002), the strongest design would have been to control for pre-disaster symptoms when assessing the effects of participation on health complaints and concerns. Survivors with prior mental health problems appear to be at greater risk for new or renewed problems after disasters than other survivors. For example, North et al. (1999) found pre-disaster psychiatric disorder to be a predictor for post-disaster PTSD among survivors of the Oklahoma City bombing.

Practical implications

The chaotic aftermath of the Bijlmermeer aviation disaster has led to the understanding that providing information and advice to the victims should be radically improved (Gezondheidsraad, 2006). From this, the idea developed to establish an Information and Advise Centre after a disaster to prevent psychological damage due

to badly organised aftercare. After the fireworks disaster in Enschede in 2000 an Information and Advice Centre functioned for the first time in the Netherlands.

Our study results show that in particular participants with a low level of education, of non-western ethnicity and with a high level of health complaints at baseline did not profit from this investigation. Part of this group was already excluded because they were dependent on interpreters for filling in the questionnaires. It seems important to include this vulnerable group in future interventions after disasters by designing a protocol that addresses the needs of the entire multicultural society we are living in. Hall (2001) proposed that the treatment of ethnic minorities should be adapted to be culturally sensitive. Ethnicity and culture influence mental health care utilization in the aftermath of disasters: on need for help; on availability and accessibility of help; on help-seeking comfort, and on the probability that help is provided appropriately (Norris & Alegria, 2005).

Only a limited percentage of the participants who were referred to the special aftercare services actually took advantage of this opportunity. Yet, the aftercare services were not directly connected to the MOVb. Developing an integrated health care system should promote the coordination between population screening, relief and treatment. Stepped care models, which start with monitoring of health and increasingly offer more intense care and support according to the severity and progression of complaints seem appropriate in this respect. An example of such a model is the set up of a centralised screen and treat program after the London City bombings to identify all affected individuals, screen them for mental disorders, refer them for evidence-based treatment where appropriate, and monitor outcomes (Brewin et al., 2008).

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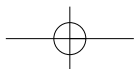
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Chapter 7

Summary and General discussion

