



The Dutch School of Epidemiology. Local and Personal Factors, Funding Agencies and Late Modern Science

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Abstract

In the 1980s and 1990s medical research in the Netherlands underwent a fundamental transformation that included the emergence of clinical research and the use of epidemiological research methods. Seen through the lens of ‘late modern science’, the blossoming of Dutch clinical epidemiology seems almost inevitable. However, a local perspective that focuses on events at a specific institution (Erasmus University in Rotterdam, the Netherlands) shows that personal and contingency factors greatly impacted the manner in which epidemiology developed. Based in large part on interviews, this article suggests that it was not academic medicine, the government or Big Pharma that took the lead in prompting a remarkable methodological shift towards clinical epidemiology. Instead, the deliberate policies of a charity fund, the Dutch Heart Foundation and a corporate body, the Health Insurance Council, were of crucial importance in bringing about the ‘Dutch School of Epidemiology’.

Keywords: epidemiology, late modern science, medical history, research funding, the Netherlands

Introduction

‘The Dutch have taken a hard look at medical research and transformed it’. This was the core message of a ‘country profile’ on the Netherlands,

published in *the Lancet* in 1996. The transformation of Dutch medical research was characterized as ‘a big swing towards clinical research’.¹ Whereas in the early 1980s several institutes sounded the alarm bell about the deplorable state of clinical research in the Netherlands, a decade later the field was blossoming. Furthermore, the focus had ‘shifted to clinical epidemiology to such an extent, that patient-related research was often equated with it’.²

Clinical epidemiology, which applied epidemiological methods to clinical research questions and populations, was remarkably successful in establishing a firm academic position in the Netherlands.³ This was recognized by the editor of the *Journal of Clinical Epidemiology*, who wrote in 1996: ‘I am inclined to say that the combined efforts of Alvan R. Feinstein at Yale, David L. Sackett at McMaster, Sir Donald Acheson at Southampton, and what I call the “Dutch School” of epidemiology, deserve the lion’s share of credit for the vigorous existence and advancement of clinical epidemiology’.⁴ The methodological expertise of this ‘Dutch School of epidemiology’ allowed clinical researchers in the Netherlands to become early adopters in the field.⁵ Since then, both general and clinical epidemiology have been fields in which Dutch research has excelled internationally.⁶

The transformation of Dutch medical research fits a general international pattern of a shift from little to big science, the rise of a publish-or-perish culture and the increasing commodification of research.⁷ More specifically, the growing influence of statistical-epidemiological methods on clinical research was an international phenomenon, which culminated in the current era of ‘evidence-based medicine’ and a thriving clinical trial industry.⁸ Nevertheless, a local rather than international perspective is helpful in shedding light on the development of late modern science and the role of funding bodies. In his book *The Progress of Experiment*, on the rise of the Randomized Controlled Trial (RCT) in the United States, the historian Harry Marks states: ‘While the controlled clinical trial may be an international scientific accomplishment, the ways in which trials were organized and understood mark them as belonging to a particular place as well as time’.⁹

Inspired by Marks, this article aims to explore the rise of (clinical) epidemiology in the Netherlands from a local perspective, focusing on events at the Erasmus University in Rotterdam.¹⁰ As an exercise in ‘micro-history’, it takes the viewpoint of the historical actors themselves. Partly because archival sources were either lacking or

inaccessible, the following relies largely on (retrospective) medical publications and interviews with exponents of the ‘Dutch school of epidemiology’. The group of people interviewed was established rather arbitrarily, mainly on the basis of (quick) availability and a willingness to be interviewed. In no way do the interviews purport to provide ‘hard evidence’. They mainly have an exploratory function, to find out relevant questions, issues and entries for further research. Yet, the interviews offer an insight into the personal motives and drives of prominent representatives of clinical epidemiology in the Netherlands and, sometimes, fascinating ‘glimpses behind the scenes’.¹¹

The small scale and the insiders’ perspective help to balance general, structural factors on the one hand with local, contingent and personal factors on the other. Most accounts of late modern science systems tend to stress the roles of the state, bureaucrats and planners, and industry, but the story presented here sketches a more nuanced picture. The interviews conducted and the sources studied suggest that it was not academic medicine, the Dutch government or Big Pharma which took the lead in the remarkable methodological shift towards clinical epidemiology in the Netherlands. Instead, the deliberate policies of a charity fund (the Dutch Heart Foundation) and a corporate body (the Health Insurance Council) appear to have been of crucial importance in bringing about the ‘Dutch School of epidemiology’. This occurred in the form of a ‘virtuous circle’: an upwards spiral driven by international, national and, no less importantly, local factors.

The first section sketches the establishment of the department of epidemiology of Erasmus University and how its first successes were fueled by the Health Insurance Council’s Prevention Fund. The second section highlights how, supported by the Dutch Heart Foundation, the Finnish-American theorist of epidemiology, Olli Miettinen, made a lasting impact on Dutch epidemiology. The third section outlines how, in the context of a radically changing climate of academic research, epidemiologists from Rotterdam contributed to the expansion of general and clinical epidemiology in the Netherlands. The driving role of the Investigative Medicine Fund, managed by the Health Insurance Council, is considered in the fourth section. Finally, the concluding section discusses how ‘following the money’ at the local level and how the analysis of the role of the Dutch Heart Foundation and the Health Insurance Council offers new insights into the late modern scientific enterprise.

Epidemiology in Rotterdam

In 1969, the first chair and the first independent department of epidemiology in the Netherlands were established in Rotterdam. This happened at the instigation of Andries Querido, who, from 1966 until 1969, was the founding dean of the newly established medical faculty in the city. The dean had to use all his powers of persuasion to push through the nomination of Hans Valkenburg, trained as a specialist in internal medicine, as professor of epidemiology.¹²

The appointment of Valkenburg did not seem to fit epidemiology's marginal position in the Netherlands, where, at the time, the discipline was generally considered to be merely an auxiliary to social medicine.¹³ Between 1955 and 1970, nearly every medical faculty had a full professor of social medicine, who supervised an independently operating institute. Increasingly, however, both friend and foe had second thoughts about the scientific basis of social medicine, as little research emerged in this field. Moreover, social medicine did not appeal much to medical students.¹⁴ Querido, too, did not hold social medicine in high regard. In his view, 'precious little good and relevant research' had come from that corner.¹⁵ In this respect, he saw much more potential in epidemiology, given the methodological sophistication this discipline had recently acquired, particularly in Anglophone countries, through the study of risk factors of chronic conditions. Querido therefore decided to give epidemiology in Rotterdam an independent status, with a chair and department of its own, rather than placing it within an Institute for Social Medicine.¹⁶

Initially, the new department was not a great success.¹⁷ The situation improved in 1975, when Valkenburg had scraped together enough money for the launch of a research programme: the Epidemiological Preventive Research Zoetermeer (EPOZ), a prospective cohort study in which, eventually, 10,000 residents of Zoetermeer, a small town near Rotterdam, were followed. Financial support from the Dutch Prevention Fund was crucially important to the EPOZ. The Prevention Fund drew on means from the Health Insurance Fund and, was therefore managed by the Health Insurance Council, the body that until 1998 supervised social health insurance funds in the Netherlands and also provided policy advice to the Ministry of Health. The composition of the council, which consisted of representatives of employers' organizations, trade

unions, health insurance funds and healthcare providers, reflected the corporatist structure that at that time characterized the Dutch welfare state and healthcare system.¹⁸

After the General Act on Exceptional Medical Expenses (Dutch abbreviation: AWBZ) had come into force on 1 January 1968, the revenue of the Prevention Fund was derived from the General Fund for Exceptional Medical Expenses, which was also managed by the Health Insurance Council. The act stipulated that 10 million guilders¹⁹ was to be paid into the Prevention Fund annually, and that this amount would be adapted according to the fluctuations of the index figure for wages in the Netherlands. This led to a considerable increase in the size of the Prevention Fund. In 1975, the fund could already spend 20.7 million guilders. Recommendations for research projects to be funded were made by a scientific advisory council, in which Querido held a prominent role, particularly in 1973. Whether coincidental or not, in that year Valkenburg received 1,392,000 guilders from the Prevention Fund. In 1975 another 226,500 guilders would follow.²⁰

The EPOZ eventually gave rise to important research results and international publications. The programme also offered Valkenburg the opportunity to recruit PhD students. As a rule, these were young physicians who could not yet embark on their specialized training and had therefore decided to carry out a PhD research to bridge the waiting period. For some of them this signified, usually unintentionally, the onset of a career in epidemiology. Examples include Albert Hofman, who succeeded Valkenburg in 1988; Jan Vandenbroucke, who was appointed as professor of clinical epidemiology in Leiden in 1987; and Rick Grobbee, who became professor of clinical epidemiology in Rotterdam in 1993 and in Utrecht in 1996. They were initiated into epidemiological research in the EPOZ at the beginning of the 1980s.²¹ Together, Valkenburg and his co-workers formed a 'most innovative and inspiring' department and a 'hotbed of critical minds'.²²

In addition to the synergy between the epidemiologists in Rotterdam, Anglophone examples were of key importance to the research programmes of the department.²³ The main influence from abroad was probably the Finnish-born Olli Miettinen, a theorist and methodologist of epidemiology, who in the 1970s and early 1980s was based at the School of Public Health of Harvard University in Boston. Miettinen had been invited to Rotterdam by Paul Hugenholtz, the professor of

cardiology at the new medical faculty. Shortly after the World War II Hugenholtz had left the Netherlands for the United States, where he ended up working as a cardiologist at the Children's Hospital at Harvard Medical School in Boston. It was there that he met Miettinen. In 1965, Querido, on a visit to Boston, offered Hugenholtz the professorship in Rotterdam. Querido had started looking for suitable people in the United States with whom he could fulfil his ambition to give research a more central place in the new Rotterdam faculty than was usual in the Netherlands.²⁴

Hugenholtz took a personal interest in epidemiology, triggered by various developments in the field of cardiovascular epidemiology in the United States. Querido also enjoined upon him that he had a moral obligation to 'give something back' to the citizens of Rotterdam. The dean's suggestion resulted in the launch of an epidemiological study at the cardiology department: the IMIR research (Imminent Myocardial Infarction Rotterdam research), in which the characteristics of patients with myocardial infarction as admission diagnosis were studied. In order to get the IMIR research off the ground methodologically, Hugenholtz had Miettinen 'flown in' as an advisor.²⁵ He left the further development of the epidemiological activities largely to his protégé Koos Lubsen, who obtained a PhD on the basis of the IMIR research. Hugenholtz was his supervisor, Miettinen one of the co-supervisors.²⁶ Lubsen was highly impressed by Miettinen, once describing him as 'one of the most important theorists and perhaps the "Leibniz" of modern epidemiology',²⁷ who 'turned medicine into an exact science'.²⁸

Miettinen did not just influence Lubsen and the cardiology department. The researchers of Valkenburg's department also frequently collaborated with Miettinen and soon incorporated his ideas.²⁹ It did not take long, moreover, before Miettinen was also discovered by scientists with an interest in epidemiology elsewhere in the Netherlands. The Dutch Heart Foundation played an important role as a mediator here.

The Dutch Heart Foundation and 'the Dutch School of Miettinen'

Early in the 1970s, Hugenholtz had already brought Miettinen into contact with Bart Dekker, the medical director of the Dutch Heart

Foundation. Dekker regarded Miettinen as ‘a genius, one of the few true geniuses I know’³⁰ and managed to recruit him as advisor to the foundation. This meant that Miettinen was able to come to the Netherlands several times a year. He used the opportunity to regularly give his famous courses on the theory and methodology of epidemiology. Furthermore, with funding from the Heart Foundation, Dekker arranged for a number of people to be posted to Harvard for a year to study with Miettinen and follow the epidemiology master’s programme there.³¹

When they had returned from Boston, these people, in turn, gave courses in the spirit of Miettinen, mostly with the aid of the Heart Foundation.³² The number of these courses rose swiftly in the Netherlands in the early 1980s. This was partly due to the lack of formal training programmes in epidemiology.³³ When, for example, Yolanda van der Graaf (a future professor of clinical epidemiology in Utrecht) became involved in epidemiological research in the mid-1980s, she found that regular training opportunities in this area simply did not exist. Instead she followed several of the aforementioned courses, including one with Miettinen, ‘as anyone in the Netherlands with any interest in epidemiology did’.³⁴

The Dutch people involved are univocal on Miettinen’s exact merit: he taught them a way of thinking.³⁵ Exemplary is the way in which Vandenbroucke, during his inaugural lecture as professor of clinical epidemiology in Leiden, addressed Miettinen in 1987: ‘I learned *how to think* under your guidance and tutelage’.³⁶ Miettinen defined epidemiological research as ‘occurrence research’.³⁷ Here he deviated from more common definitions of epidemiology in which the ‘dissemination’, ‘distribution’ or ‘frequency’ of disease within (part of) the population, as well as its determinants, were usually identified as subject of study.³⁸ In Miettinen’s view, these descriptions only indicated an application area and not a fundamental concept. He was of the opinion that a scientific discipline was to be defined on the basis of its object of research. In the case of epidemiology, the formal object of study was the ‘occurrence relation’: the functional relationship between a determinant and outcome. If a researcher first defined the ‘occurrence relation’ involved, how the research was to be set up would follow (almost) automatically.³⁹

From Miettinen’s courses ‘the nucleus for epidemiology in the Netherlands originated’.⁴⁰ A striking number of the ‘young people, who

were gripped by epidemiology'⁴¹ ended up in important and strategic places within epidemiology, clinical epidemiology, evidence-based medicine and healthcare policy. Thus, they became the teachers of new generations of (medical) scientists in the Netherlands.⁴² In the textbooks they used (and wrote)⁴³ on both general and clinical epidemiology, Miettinen's approach was used as a starting point. Today, in the Netherlands, probably one of the countries with the most epidemiologists per capita,⁴⁴ young epidemiologists and clinical researchers continue to be 'raised' with the Miettinen's ideas.

His influence on research in the Netherlands was of no less significance than his influence on training and education. Those involved argue that the teachings of Miettinen enabled them to publish in renowned international journals and make considerable progress in securing funding for new research projects. As data on publications, promotions and research budgets indicate, Dutch epidemiology ended up in a virtuous circle from 1980 onwards.⁴⁵

Interesting in this context is the role Miettinen fulfilled as advisor to the Dutch Heart Foundation. Between 1978 and 1984 the foundation's annual budget for research funding increased from approximately 4.5 million guilders to 29 million guilders. This attracted a significant number of grant applications, most of which Dekker found to be of poor quality. He therefore regularly asked Miettinen to assess the research proposals submitted to the Heart Foundation. As he was secretary of the Scientific Advisory Board, the body that decided on the allocation of funding, Dekker was able to put forward the critical comments of his advisor on submitted applications during the meetings of this board. Thus, he managed to avoid 'granting subsidies to projects that were doomed to failure'.

Moreover, Miettinen's role extended beyond helping to reject unsuitable research proposals. In the event of inadequate yet 'fixable' funding requests, Dekker would ask Miettinen to talk to the researchers in question and help them to improve and rewrite their research proposal, so that they could still receive the funding. The majority of research proposals, however, were rejected because of insufficient methodological quality. As a result, in this period, the Foundation had more money than was spent on research subsidy. For a while this offered the Foundation the opportunity to develop projects of their own. For several years, the Heart Foundation even had an epidemiology department of its own,

which underlines how much Dekker wanted to redirect research in the cardiovascular field towards epidemiological approaches and methods. The first head of this department was Vandenbroucke, but Miettinen was also closely involved.⁴⁶

Dutch Epidemiology and the Late Modern Scientific Enterprise

The critical manner in which Dekker and Miettinen dealt with funding applications at the Heart Foundation partly preceded, but also fit well with a significant change of the Dutch research climate. Around 1980, the Dutch government took ‘a torrent of measures that would change the face of university research for good’.⁴⁷ These measures were, above all, intended to cut costs in times of tough economic circumstances, but the government also aimed to redirect scientific research in three ways. Firstly, the government strove for more societally-driven research. It therefore shifted emphasis in research funding from the so-called ‘first flow of funds’ (the direct funding of universities by the state) to the ‘second and third flow of funds’. Separate financing schemes were created for research focused on specific social needs. Management of such funds was delegated to organizations such as the Netherlands Organisation for Pure Scientific Research (abbreviated as ZWO until 1988, when ‘Pure’ was removed from the organization’s name, which then became NWO). In 1980, the second and third flow of funds combined contributed less than 30% to the funding of university research, but in 2000 this figure had risen to approximately 50%.

Secondly, the government wanted to promote the programming of scientific research. Between 1960 and 1980, the number of person years devoted to research at Dutch universities had risen from 1600 to 5700. This massive expansion had barely been accompanied by any coordination within and between universities. The growth was related to the third policy aim, quality improvement. There was a widespread feeling that the quality of academic scientific research was deteriorating as a result of the rapid (quantitative) growth of the preceding decades. Against this background, the universities were faced with two major rounds of cutbacks by the Ministry of Education and Science, launched under the titles of ‘Task Division and Concentration’ and ‘Selective Shrinkage

and Growth', in 1983 and 1986 respectively. These operations were aimed at saving money by encouraging universities to schedule their research programmes better, to set priorities in their research policy and to properly coordinate research in general. Almost simultaneously, in 1984, the ministry introduced a system of 'conditional funding': a large part of the first flow of funds would be granted only under strict conditions. One of these conditions was the presence of coherent research programmes of considerable scope.⁴⁸

These governmental policies in many ways heralded a new era of academic research.⁴⁹ University researchers could no longer count in advance on monies from the first flow of funds, as the external assessment, which formed part of the conditional funding, proved to be anything but a formality. In addition, they increasingly had to compete with their peers for the (second flow of) funds placed with organizations such as ZWO (subsequently NWO) and ZON (Health Research the Netherlands). Professors could no longer 'freely pursue their own interests'⁵⁰ either, as university administrators soon understood the importance of improved organization, coordination and planning of research activities. This led, among other things, to targeted choices with respect to the establishment of specific 'lines' of research. From the late 1980s onwards, moreover, intra and inter-university research schools were established that have since occupied a central position in the structure of academic research.⁵¹

In these new circumstances, the achievements of Dutch epidemiologists began to be noticed, not least among university administrators. While in the eyes of many the institutes for social medicine fell short in scientific productivity, epidemiology seemed to be able to cope much better with conditional funding and competition for research subsidies. This was also explicitly mentioned in 1985 by the KNAW (Royal Netherlands Academy of Arts and Sciences) in an influential advisory report on the programming of medical research in Dutch universities. The report stated that social medicine at medical faculties 'was poorly represented in terms of research', while epidemiological research in the Netherlands was 'on the rise'.⁵²

Thus, it was not by chance that, in the mid-1980s, new professors of (general or clinical) epidemiology were appointed at various universities, mainly at the expense of the academic position of social medicine. Cases in point are the appointments of Sturmans in 1982 and Knipschild in 1985, both in Maastricht, and Vandenbroucke in 1987

in Leiden. Vandenbroucke was put in charge of a new department of clinical epidemiology, with the same budget and number of full-time posts as the Leiden Institute for Social Medicine, which had only just been fully disbanded. Lubsen and Hofman stayed in Rotterdam, where they became professors in 1986 and 1988 respectively, as did Grobbee in 1992. In 1987, moreover, Miettinen was appointed as full professor in the theory of medicine at VU University in Amsterdam, where he became director of the Institute for Health and Care Research (Dutch abbreviation: EMGO-instituut), which would develop into an important centre in the field of epidemiology under Miettinen's successor Lex Bouter. Due to conflicts that soon arose, Miettinen's professorship did not turn out to be a great success, but it is illustrative of the academic status epidemiology managed to acquire and of the significance that was attached to the role Miettinen had played as a theorist.⁵³

Under the leadership of this new generation of professors, epidemiological research in the Netherlands saw strong growth from the late 1980s onwards. The Rotterdam department still led the way. Within several years, the 'unregulated mess' from the days of Valkenburg was transformed into a large, well-organized department in which tens of PhD students and as many staff members found employment. For the purpose of training PhD students, the research school NIHES (Netherlands Institute for Health Sciences) was founded in 1992, with general, clinical and genetic epidemiology as spearhead disciplines. Grobbee points out that in Rotterdam a 'very business-like approach to research' developed, where an 'entire machinery for PhD research' was created, 'with a good training programme, a solid infrastructure in which data could be collected, and major scientific production, which by any standard could compete with that resulting from internal medicine, cardiology, and so on'.⁵⁴ The flagship of Rotterdam epidemiology was the ERGO, better known as 'Rotterdam Study', a major cohort study launched in 1989. At the fortieth anniversary of the department in 2009, it was proudly announced: 'Of the top 25 most frequently cited Dutch researchers, six are affiliated with the ERGO'.⁵⁵

Again: the Health Insurance Council

In 1996 Grobbee moved to Utrecht to become professor of clinical epidemiology there. His appointment was the result of years of lobbying

by a number of clinical researchers in Utrecht under the leadership of Jan van Gijn, a prominent professor of neurology. Van Gijn was convinced that clinical research, in particular in the form of randomized trials, was required for a better substantiation of medical practice. He had experienced how important the methodological input of epidemiologists could be, not least in terms of getting the research published in high impact journals, which was of crucial importance in the context of the changing research climate in the Netherlands. In 1987 Van Gijn and two other clinical professors successfully lobbied for the appointment of a clinical epidemiologist, Yolanda van der Graaf, who we have already mentioned above.⁵⁶

An immediate reason for this lobby was the decision of the Health Insurance Council to adopt the Investigative Medicine Fund and raise its yearly budget from 9 to 36 million guilders. The research to be funded would evaluate the (cost-)effectiveness of methods and techniques in patient care, in order to generate data that would enable specific decision-making with respect to ‘whether or not to include or remove provisions from the statutorily insured package’.⁵⁷ In other words, the purpose of the Investigative Medicine Fund was to contribute to cost containment in healthcare. Its effect, however, was a major boost to clinical epidemiology in the Netherlands. As noted by Grobbee, the fund ‘generously injected money into clinical-epidemiological projects’.⁵⁸ Patrick Bossuyt, who was trained at Lubsen’s clinical epidemiology unit in Rotterdam and subsequently became professor of clinical epidemiology in Amsterdam, even stressed that the Investigative Medicine Fund was ‘unique in the world’, as it created ‘a tradition of already twenty-five years of patient-related research in the Netherlands, which is relevant to practice’.⁵⁹

As had previously been the case with the Dutch Heart Foundation, not even the full research funding budget was spent during the first years of the Investigative Medicine Fund – not because there was insufficient interest in it, but because the vast majority of the applications submitted were of insufficient quality. This resulted in a high percentage of rejections.⁶⁰ The committee subsequently made a recommendation expressing that the methodological input of clinical epidemiologists could be decisive for the acceptance of projects. It also expressed which basic shortcomings occurred in applications without such a methodological input.⁶¹

This is precisely in line with the task of Van der Graaf as clinical epidemiologist in Utrecht. She supported clinicians who wished to submit a project proposal to the Investigative Medicine Fund. Reminiscent of Miettinen's role at the Heart Foundation, her interference went quite far at times. She 'would sometimes literally grab the pen from people, as if to say: let me write this down'. And this paid off in the honouring of funding applications in which she had participated. Such was her success that within several years two more clinical epidemiologists could be appointed within her unit.⁶²

Van der Graaf and colleagues made clinical epidemiology so popular in Utrecht, that the professor of general epidemiology was pushed to take an early retirement in 1995 and was succeeded in 1996 by Grobbee as professor of clinical epidemiology. When he moved to Utrecht, Grobbee was accompanied by five staff members from Rotterdam and in the next years ten more researchers made the same switch. Grobbee also brought the business-like approach to research which had developed in Rotterdam. As a result, a self-reinforcing process of sorts was set in motion: as his department could do more research projects, the 'output' became bigger and the 'track record' improved, which made it easier to attract more projects, and so on. In fifteen years' time, the department, which initially employed about twenty people, developed into a division of the UMC Utrecht, with approximately 500 staff.⁶³

This trend of expansion and commodification also occurred with other university departments in the fields of general and clinical epidemiology. This was noted by a joint report in 1999 by the KNAW and the Association of Cooperating Dutch Universities in which epidemiology (including clinical epidemiology) was identified as one of the areas in which the Netherlands excelled internationally. More recent reports by such organizations also mentioned (clinical) epidemiology as being one of the most 'prominent' areas of scientific research in the Netherlands.⁶⁴

Discussion: Local and Personal Factors, Unexpected Funding Agencies and Late Modern Science

The current state of (clinical) epidemiology in the Netherlands, as one of the country's most internationally competitive fields of research, fits the notion of 'late modern science'. The methodological development,

growth and commodification of this discipline in the Netherlands and, in particular, Rotterdam, must be placed in the context of the metamorphosis experienced by university research over the past decades, particularly at medical faculties. The transformation of the scientific climate in the Netherlands did not occur on its own, moreover, and may largely be interpreted as being part of international trends such as the ‘transition from little science to big science’.⁶⁵

The notion of ‘late modern science’ and the global, international gaze may give the impression that the blossoming of Dutch epidemiology was almost inevitable, or happened according to a more or less compelling logic. However, the local perspective of this article indicates that personal and contingency factors greatly impacted the manner in which epidemiology developed in the Netherlands. The role played by Querido and Miettinen among others is illustrative.

Querido was responsible for the establishment of the first independent department of epidemiology in the Netherlands (and, possibly, the funding of its first successful cohort study). In the words of Hofman, Querido enabled epidemiology to break free from social medicine, allowing it to ‘map out its own future’.⁶⁶ Another exponent of the Rotterdam department, Vandenbroucke, stressed: ‘The greatest successes of Dutch epidemiology in recent years originated in places where small groups of researchers spontaneously found each other “on the shop floor”’.⁶⁷ Implicitly, Vandenbroucke raises questions about the current standards of success in research (expansion, large-scaled organization, a ‘business-like approach’) by pointing at the synergy between the handful of enthusiasts who were ‘gripped by epidemiology’ in the late 1970s and early 1980s.

Miettinen’s impact in the Netherlands seems hard to overestimate. This is in remarkable contrast with his (lack of) formal status within epidemiology, as he was never able to develop a strong institutional position for himself. He mainly influenced Dutch researchers via workshops and courses as well as verbal, often informal contacts, which did not leave much written evidence. Miettinen’s significance has only become apparent through the local perspective taken in this article and through the oral history interviews with local actors.⁶⁸

Miettinen was able to make his mark on Dutch epidemiology more or less ‘by chance’. Again Querido played a role, but it was Hugenholtz who introduced Miettinen in Rotterdam and also put him in touch with

Bart Dekker of the Heart Foundation. The charity fund not only contributed to the expansion of epidemiological research, but also, and more importantly, to a specific methodological development which was an important feature of the transformation of Dutch medical research addressed in the *Lancet*'s 'country profile'.⁶⁹ By encouraging young scientists to be trained by Miettinen, either by sending them to Harvard for a year or by sponsoring Miettinen's courses in the Netherlands, the Heart Foundation raised the teachers of future generations of epidemiologists and clinical researchers. Miettinen and his students were instrumental in improving the research designs, research output and fundraising capacities of Dutch medical scientists. The most striking examples are the roles fulfilled by Miettinen himself at the Heart Foundation and by Van der Graaf in Utrecht.

Van der Graaf's main task was to support clinicians who wished to submit a project proposal to the Investigative Medicine Fund, which was managed by the Health Insurance Council. In the 1970s, this corporatist body was also responsible for the Prevention Fund, which subsidized the first cohort study of the Rotterdam epidemiology department. The roles of both the Health Insurance Council and the Heart Foundation cast new light on the place of funding bodies in 'late modern science', highlighting the power and interests of the state and of big industry. Admittedly, the Dutch state played a huge role in transforming the climate of academic research in the Netherlands, while 'Big Pharma' was, and remains, a main driver of medical research. However, the two Dutch funding bodies were crucial in bringing about the 'Dutch school of epidemiology' and a remarkable methodological shift towards clinical epidemiology and patient-related research in the Netherlands. The Health Insurance Council was a representative of the corporatist structure of the Dutch healthcare system and welfare state. The Heart Foundation was a symbol of the (indirect) involvement of citizens, as in the Netherlands there is a tradition of donating considerable amounts of money to charities. Moreover, there is a growing trend of fundraising via (social) media events. Thus, citizens, society and (social) media have a significant influence on the agenda and scope of scientific research.⁷⁰

Although these conclusions are tentative or even speculative, they do suggest new avenues for further research. In understanding the scientific enterprise and the role of funding agencies, one must look

beyond Friedson's three logics: state, market and profession.⁷¹ In different ways, the Health Insurance Council and the Heart Foundation seem to fit a 'fourth logic', that of 'civil society'. Moreover, as the local, Rotterdam story of epidemiology illustrates, individual actors also shape the course science takes, even in late modernity.

Notes

- 1 'The Netherlands', *Lancet* 347 (1996) 1229–39.
- 2 W. Wieling, 'Het spectrum van klinisch-wetenschappelijk onderzoek', *Nederlands Tijdschrift voor Geneeskunde* 135 (1991) 643–5, at 644.
- 3 T. Bolt, *A Doctor's Order: The Dutch Case of Evidence-Based Medicine (1970–2015)* (Antwerp, Apeldoorn, 2015) 155–261, on which this article is largely based.
- 4 W.O. Spitzer, 'The Future of Epidemiology', *Journal of Clinical Epidemiology* 49 (1996) 705–9, at 706 (my italics).
- 5 D.L. Sackett, 'Clinical Epidemiology: What, Who and Whither', *Journal of Clinical Epidemiology* 55 (2002) 1161–6.
- 6 See e.g. KNAW, *Advies voor het Deelplan Onderzoek van het Disciplineplan Geneeskunde* (Den Haag, 1985); KNAW, *Discipline Report on (Bio) Medical and Health Science Research in the Netherlands 1998* (Amsterdam, [1999]); Raad voor Medische Wetenschappen, *Gezondheidsonderzoek: het investeren waard* (Amsterdam, 2007).
- 7 D.J. De Solla Price, *Little Science, Big Science* (New York, London, 1963); P. Galison and B. Hevly (eds), *Big Science: The Growth of Large Scale Research* (Stanford, 1992); J. Heilbron, M. van Bottenburg and I. Geesink, *Wetenschappelijk onderzoek: dilemma's en verleidingen* (Amsterdam, 2000); F. Miedema, *Science 3.0.: Real Science, Real Knowledge* (Amsterdam, 2012); J.R. Ravetz, *Scientific Knowledge and its Social Problems* (Oxford, 1971).
- 8 Bolt, *A Doctor's Order*, 85–153; J.P. Vandenbroucke, 'De opkomst van de medische statistiek en epidemiologie in het klinisch wetenschappelijk onderzoek van de afgelopen eeuw', *Nederlands Tijdschrift voor Geneeskunde* 143 (1999) 2625–8.
- 9 H.M. Marks, *The Progress of Experiment. Science and Therapeutic Reform in the United States, 1900–1990* (Cambridge, 1997) 6–7 (my italics).
- 10 For a broader sketch of the history of clinical epidemiology, both internationally and in the Netherlands: Bolt, *A Doctor's Order*, Chapters 3–6.

- 11 Ibid., 36–7, 419–20.
- 12 T. Bolt and M. van Lieburg, *Erasmus MC: 50 jaar academische gezondheidszorg in Rotterdam* (Utrecht, 2016) 67; A. Hofman, *Veertig jaar epidemiologie aan de Erasmus Universiteit 1969–2009* (Rotterdam, 2009) 11–4; A. Querido, *De binnenkant van de geneeskunde* (Amsterdam, 1990) 199, 210–11; H.A. Valkenburg and A. Hofman, *Een kwart eeuw Hippocratische epidemiologie* (Utrecht, 1995) 44–5.
- 13 ‘Jaarverslag 1976 Geneeskundige Hoofdinspectie van de Volksgezondheid: achterstand gezondheidszorg op het gebied van management en epidemiologie’, *Medisch Contact* 33:5 (1978) 137–41; F. Sturmans and H.A. Valkenburg, ‘Epidemiologie (I): begripsomschrijving en plaatsbepaling’, *Medisch Contact* 31:35 (1976) 1111–7; Valkenburg and Hofman, *Kwart eeuw*, 44, 51.
- 14 On the problems of social medicine as addressed by representatives of the discipline themselves: ‘Dr. H. Rengelink, Voorzitter College voor Sociale Geneeskunde’, *Medisch Contact* 45:49 (1990) 1463–4; J. Bosman and J.W.H. Garvelink, ‘Sociale geneeskunde moet zich sterker profileren’, *Medisch Contact* 39:22 (1984) 680; J.B. Ringoir, ‘Nieuwe bloei voor sociale geneeskunde? Ontwikkelingen in kaart gebracht’, *Medisch Contact* 48:2 (1993) 55–7; J. K. van Wijngaarden and P. Schnabel, ‘School of Public Health: een Nieuwe Opleiding in Nederland’, *Medisch Contact* 46:38 (1991). 1107–10.
- 15 These are not Querido’s own words, but Valkenburg’s in his valedictory lecture (many years later) about Querido’s views on social medicine. See: Valkenburg and Hofman, *Kwart eeuw*, 16.
- 16 See note 12 above.
- 17 Valkenburg and Hofman, *Kwart eeuw*, 45–54.
- 18 M. van Bottenburg, G. de Vries and A. Mooij, *Zorg tussen staat en markt: de maatschappelijke betekenis van de Ziekenfondsraad, 1949–1999* (Zutphen, 1999); K.P. Companje (ed.), *Tussen volksverzekering en vrije markt: verzekering van zorg op het snijvlak van sociale verzekering en gezondheidszorg 1880–2006* (Amsterdam, 2008); R.A. Vonk, *Recht of schade: een geschiedenis van particuliere zorgverzekeraars en hun positie in het Nederlandse zorgverzekeringsbestel, 1900–2006* (Amsterdam, 2013).
- 19 Approximately 4.53 million euros (without inflation correction).
- 20 Van Bottenburg, De Vries and Mooij, *Zorg tussen staat en markt*, 77–8; Praeventiefonds, *Verslag over de Werkzaamheden van het Bestuur van het Praeventiefonds over het Jaar 1973* (’s Gravenhage, [1974]);

- Praeventiefonds, *Verslag over de Werkzaamheden van het Bestuur van het Praeventiefonds over het Jaar 1975* ('s Gravenhage, [1976]).
- 21 Hofman, *Veertig jaar epidemiologie*, 16–20, 27, 30–2, 203; Valkenburg and Hofman, *Kwart eeuw*, 1, 45, 51–3, 57–61, 64–5, 70. Both books contain lists with dissertations and ('top') publications from people of the department. See also PubMed and other databases or search engines See for the commentaries on all this from the early 1980s itself: A. Hofman, 'Epidemiologie, waarheen?' *Tijdschrift voor Sociale Geneeskunde* 60 (1982) 815–6; J.P. Vandenbroucke, 'Overpeinzingen bij WEON-VIII', *Tijdschrift voor Sociale Gezondheidszorg* 61 (1983) 754.
- 22 Quotes from the author's (henceforth: TB) interview with Grobbee (23 January 2012). Similar qualifications were used by people from inside as well as outside the Rotterdam department of the 1970s and 1980s: TB's interviews with 'outsiders' Harry Büller (12 September 2011), Bart Dekker (9 July 2011), Siep Thomas (12 January 2012), and the 'insider' Jan Vandenbroucke (24 May 2011). See also note 21 above and Bolt and Van Lieburg, *Erasmus MC: 50 jaar*, 120–2.
- 23 See notes 21 and 22 above.
- 24 Interview TB with Hugenholtz (23 January 2013); Bolt and Van Lieburg, *Erasmus MC: 50 jaar*, 18–22; Querido, *Binnenkant*, 194.
- 25 Interview TB with Hugenholtz; Querido, *Binnenkant*, 206–7.
- 26 E. van der Does and J. Lubsen, *Acute Coronary Events in General Practice: The Imminent Myocardial Infarction Rotterdam Study* (Rotterdam, 1978); Hofman, *Veertig jaar epidemiologie*, 19, 23.
- 27 J. Lubsen, *Epidemiologie als wegwijzer bij medisch handelen* (Rotterdam, 1986) 6.
- 28 Cited in Hofman, *Veertig jaar epidemiologie*, 20.
- 29 *Ibid.*, 19.
- 30 Interview TB with Dekker.
- 31 These included Dekker himself, Lubsen and Frans Kok, who would become professor at the Agricultural University of Wageningen. Ale Algra, the latter professor of clinical epidemiology in Utrecht was posted to Boston by the Heart Foundation, where he pursued the Master of Science in Epidemiology at the Harvard School of Public Health in the academic year 1984–1985. Miettinen had just left for McGill University in Montreal then, but his impact was still noticeable in Boston according to Algra. In addition, Miettinen twice returned to Boston for a week to give his 'famous course'. Interview TB with Algra (11 March 2011); A. Algra, *Hoofdzaken* (Leiden;

- 2006) 14; A. Klaassen, V. Manger Cats, M. Heshusius, and E. van der Wall (eds), *Een eeuw hart- en vaatziekten in Nederland: wetenschappelijk onderzoek, preventie, diagnostiek, therapie* (Zwolle, 2004) 20, 191–5.
- 32 Interviews TB with Dekker, Grobbee, and Vandenbroucke; Hofman, *Veertig jaar epidemiologie*, 21.
- 33 Interview TB with Van der Graaf (30 March 2012); Algra, *Hoofdzaken*, 14.
- 34 Interview TB with Vandenbroucke.
- 35 This is literally stated in these terms by Van der Graaf and Grobbee, but several other interviewees used similar terms; see also the words of thanks addressed to Miettinen in several inaugural lectures (note 36 below).
- 36 J.P. Vandenbroucke, *Klinische epidemiologie en de geest der hygiënisten* (Utrecht, 1987) 23 (original italics). For similar words of thanks in inaugural lectures: D.E. Grobbee, *Epidemiologie, kunst en essentie* (Utrecht, 1997) 20; Lubsen, *Epidemiologie als wegwijzer*, 18.
- 37 O.S. Miettinen, *Theoretical Epidemiology: Principles of Occurrence Research in Medicine* (Hoboken, NJ, 1985) viii, 1–19.
- 38 E.g. Sturmans and Valkenburg, ‘Epidemiologie (I)’, 1112; J. P. Vandenbroucke and A. Hofman, *Grondslagen der epidemiologie* (Utrecht, 1993; 4th ed.) 1–2.
- 39 Miettinen’s Dutch pupils emphasized that they found Miettinen’s approach very effective in setting up thorough epidemiological research. Moreover the ‘occurrence relation’ proved applicable to diverse areas (e.g. public health, clinical, genetic, nutritional and pharmacological epidemiology) and types of research (e.g. aetiological, diagnostic, prognostic, and therapeutic). Interviews TB with Algra, Dekker, Van der Graaf, Grobbee, Martin Offringa (31 January 2012) and Vandenbroucke; Grobbee, *Epidemiologie, kunst en essentie*; Hofman, *Veertig jaar epidemiologie*, 18–20, 131; P. Knipschild, *Epidemiologie in de contramine* (Maastricht, 1985); Lubsen, *Epidemiologie als wegwijzer*; Martin Offringa, *Meten en wegen: klinische epidemiologie in de kindergeneeskunde* (Amsterdam, 2002) 12–4; Valkenburg and Hofman, *Kwart eeuw*, 33; Vandenbroucke and Hofman, *Grondslagen der epidemiologie*, 1–2.
- 40 Hofman, *Veertig jaar epidemiologie*, 21.
- 41 Ibid., Vandenbroucke used similar wordings in the interview with TB.
- 42 Interviews with Algra, Dekker, Grobbee, Offringa and Vandenbroucke. See also: D.E. Grobbee and A.W. Hoes, *Clinical Epidemiology: Principles, Methods, and Applications for Clinical Research* (Sudbury MA, 2009) xxi.; Hofman, *Veertig jaar epidemiologie*, 19–22, 102–3; Lubsen, *Epidemiologie*

- als wegwijzer; Offringa, *Meten en Wegen*, 12–3; J. P. Vandenbroucke and A. Hofman, *Grondslagen der Epidemiologie* (Maarsse, 1999; 6th ed.) ix.
- 43 See a.o.: Grobbee and Hoes, *Clinical Epidemiology*; A. Hofman, D.E. Grobbee and J. Lubsen, *Klinische epidemiologie* (Utrecht, 1996); Vandenbroucke and Hofman, *Grondslagen der epidemiologie*.
- 44 With 1,150 members, the Dutch Association of Epidemiology is one of the largest epidemiology associations in Europe. See: Hofman, *Veertig jaar epidemiologie*, 11, and the website of the Dutch association: <https://epidemiologie.nl/organisatie/organisatiestructuur.html>, accessed 5 October 2018.
- 45 See note 21 above.
- 46 Interviews with Dekker and Vandenbroucke; A. Olie (ed.), *De Nederlandse Hartstichting 1964–2004: plakboek van een veertigjarige* (Den Haag, 2004) 29–32, 48–9, 77; Klaassen et al., *Een eeuw hart- en vaatziekten*, 20, 191–5.
- 47 P. Baggen, ‘De wereld veranderen: universiteit en overheidsbeleid in Nederland, 1960–2000’, in: L. J. Dorsman and P. J. Knegtman (eds), *Universitaire vormingsidealen: de Nederlandse universiteiten sedert 1876* (Hilversum, 2005) 101; Ministerie van Onderwijs en Wetenschappen, *Beleidsnota Universitair Onderzoek* (’s Gravenhage, [1979]); Stichting voor Medisch Wetenschappelijk Onderzoek FUNGO, *Beleidsnota 1982 t-m 1986* (’s Gravenhage, [1981]); Adviesgroep SGO, *Stimulering van patiëntgebonden onderzoek: van onbegrip tot een begrip. Symposium ter gelegenheid van de afsluiting van het Stimuleringsprogramma Gezondheidsonderzoek (1986–1997)* (’s Gravenhage, 1997), 14–9.
- 48 This overview of the developments in Dutch governmental policies on academic research is mostly based on Baggen, ‘De wereld veranderen’. But see also E.J. Boer, ‘Knelpunten in structuur en financiering van medisch-wetenschappelijk onderzoek’, *Nederlands Tijdschrift voor Geneeskunde* 135 (1991) 430–5; A. Klijn, *Verlangen naar verbetering: 375 jaar academische geneeskunde in Utrecht* (Amsterdam, 2010) 231, 265, 269–85; KNAW, *Advies voor het deelplan*; H. Knippenberg and W. van der Ham, *Bron van aanhoudende zorg: 75 jaar Ministerie van Onderwijs [Kunsten] en Wetenschappen* (Assen, 1993) 638–784; Ministerie van Onderwijs en Wetenschappen, *Beleidsnota Universitair Onderzoek*; Raad van Advies voor het Wetenschapsbeleid, *Jaaradvies 1983* (’s Gravenhage:, [1983]); O. Schreuder, *Proeven van eigen Cultuur: vijfenzeventigjaar Katholieke Universiteit Nijmegen 1923–1998. Deel 2: 1960–1998*. (Nijmegen, 1998)

- 260–1, 276–7, 324–7; Stichting voor Medisch Wetenschappelijk Onderzoek FUNGO, *Beleidsnota*, 3, 8.
- 49 Klijn, *Verlangen naar Verbetering*, 269.
- 50 *Ibid.*, 276.
- 51 Baggen, ‘De wereld veranderen’, 104; R. S. Reneman, ‘Veranderingen in het wetenschappelijk onderzoek: van onderzoeker naar manager?’, *Medisch Contact* 53, no. 7 (1998) 235–8. On the profound effects of these governmental policies, specifically on academic medical research, Bolt and Van Lieburg, *Erasmus MC: 50 jaar*, 99–123; Klijn, *Verlangen naar verbetering*, 273–85; Knegtman, *De Medische Faculteit Maastricht: een nieuwe universiteit in een herstructureringsgebied, 1969–1984* (Assen, 1992) 184–209; A. Mooij, *De polsslag van de stad: 350 jaar academische geneeskunde in Amsterdam* (Amsterdam, 1999) 440–2, 454; H.J. Schuurman, ‘Medisch-wetenschappelijk onderzoek nu en in de toekomst: wordt “science” “fiction”?’, *Medisch Contact* 41:25 (1986) 796–8; J. Verhoef, ‘Financiering wetenschappelijk onderzoek’, *Medisch Contact* 46:2 (1991) 54–5.
- 52 KNAW, *Advies voor het deelplan*, 73.
- 53 Interviews TB with Dekker, Grobbee and Vandenbroucke; Hofman, *Veertig jaar epidemiologie*, 20, 23, 27, 32; Knipschild, *Epidemiologie in de contramine*; Lubsen, *Epidemiologie als wegwijzer*; Valkenburg and Hofman, *Kwart eeuw*, 27–41, 65; Vandenbroucke, ‘Opkomst van de medische statistiek’; *idem*, *Klinische Epidemiologie*; O. S. Miettinen, *Theory of Medicine: At the Core of Post-Flexnerian Education in Medicine?* (Amsterdam, 1987).
- 54 Interview TB with Grobbee.
- 55 Hofman, *Veertig jaar epidemiologie*, 11, 27–32; Bolt and Van Lieburg, *Erasmus MC: 50 jaar*, 120–3; Valkenburg and Hofman, *Kwart Eeuw*, 66–9.
- 56 Interviews TB with Algra, Van Gijn (18 October 2011), Van der Graaf and Grobbee; Algra, *Hoofdzaken*, 13–14; Bolt, *A Doctor’s Order*, 242–6.
- 57 Commissie Ontwikkelingsgeneeskunde van de Ziekenfondsraad, *Advies inzake Ontwikkelingsgeneeskunde 1990* (Amstelveen, [1989]), bijlage II, blad 2; Ziekenfondsraad, *Besluit Instelling Commissie Ontwikkelingsgeneeskunde* (Amstelveen: Uitgave van de Ziekenfondsraad, nr. 406 [1988]).
- 58 Interview TB with Grobbee.

- 59 Interview TB with Bossuyt (6 January 2012). The importance of the Investigative Medicine Fund (in Dutch: Fonds Ontwikkelingsgeneeskunde) was stressed by Grobbee, Bossuyt, Algra, Pim Assendelft (26 January 2012), Els Borst-Eilers (3 February 2012), Van Gijn and Van der Graaf. See also H. D. Banta, W. J. Oortwijn, W. T. van Beekum, *The Organization of Health Care Technology Assessment in the Netherlands* (The Hague, 1995) 79–92; A. Boer, *Onderzoek op maat: een verkenning van factoren voor het gebruik van Technology Assessment* (Rotterdam: Erasmus Universiteit, 2002) 75–92; L.A. van Es and A. Hofman, ‘The Dichotomy of Medicine’, *Lancet* 347 (1996) 1233–4; J. van Gijn, ‘Randomised Trials’, *Lancet* 347 (1996) 1234–5; J.H.P. van der Meulen and R.M. Timmermans, ‘Ontwikkelingsgeneeskunde: onderzoek ter onderbouwing van besluitvorming’, *Nederlands Tijdschrift voor Geneeskunde* 138 (1994) 2356–61; Raad voor Gezondheidsonderzoek, *Advies HTA-Onderzoek: organisatie van het HTA-Onderzoek* (Den Haag, 2004) 18–21.
- 60 In funding year 1989 approximately 90% of the submitted project applications were rejected; only eleven out of 113 projects were accepted. The following year, the percentage was slightly more favourable: thirteen out of 53 projects were accepted, which means approximately 75% were rejected. See: Commissie Ontwikkelingsgeneeskunde van de Ziekenfondsraad, *Advies 1990*, 15–8; G.L. Engel, ‘Ontwikkelingsgeneeskunde: hoe werkt het?’, *Medisch Contact* 47:13 (1992) 401–4; J.H. Mulder and J.T.M. Rokx, ‘Ontwikkelingsgeneeskunde: eerste beleidsplan noemt voorkeursgebieden van onderzoek’, *Medisch Contact* 46:10 (1991) 299–301.
- 61 Commissie Ontwikkelingsgeneeskunde van de Ziekenfondsraad, *Advies 1990*, 18 (my italics).
- 62 Interviews with Algra, Van der Graaf and Van Gijn. In funding year 1994 seventeen out of 56 research proposals to the Investigative Medicine Fund were accepted. Clinical researchers from Utrecht were involved in seven of the successful research projects. See Commissie Ontwikkelingsgeneeskunde van de Ziekenfondsraad, *Advies Ontwikkelingsgeneeskunde 1994* (Amstelveen, 1993). More examples of accepted research proposals from Utrecht in *Ibid.*, *Advies Ontwikkelingsgeneeskunde 1992* (Amstelveen, 1991); *Advies 1990*.
- 63 Interview with Grobbee; *Julius 15 jaar* (Utrecht, 2012) (<http://portal.juliuscentrum.nl/nl-nl/organization.aspx>, accessed 28 January 2015).
- 64 Hofman, *Veertig jaar epidemiologie*, 26–32; KNAW, *Discipline Report*; Raad voor Medische Wetenschappen, *Gezondheidsonderzoek*; W.A. van

Stiphout, R. de Vet and M. Reij, 'De kracht van de epidemiologie', *Medisch Contact* 56:23 (2001) 896–8; Vandenbroucke, 'Opkomst van de medische statistiek', 628.

65 See note 7 above.

66 Hofman, *Veertig jaar epidemiologie*, 15.

67 Vandenbroucke, 'Opkomst van de medische statistiek', 2628.

68 Interviews with Algra, Dekker, Van der Graaf, Grobbee, Offringa and Vandenbroucke.

69 See note 1 above.

70 See the reports on the website of the CBS (Dutch Central Bureau of Statistics), a.o. via: <https://www.cbs.nl/nl-nl/nieuws/2015/51/nederlandsteeds-ruimhartiger-voor-goede-doel>, accessed 30 March 2018.

71 E. Freidson, *Professionalism: the Third Logic* (Cambridge: Polity, 2001).

About the Author

Timo Bolt (PhD 2015) is a Dutch historian of science and medicine. He started his career at Utrecht University (2007–2010), where he wrote a book on child and youth psychiatry (*Kinderen van hun tijd: zestig jaar kinder- en jeugdpsychiatrie in Nederland, 1948–2008*, co-authored with Leonie de Goei), which was awarded the Martinus J. Langeveld Prijs in 2009. Between 2010 and 2015, Bolt worked at the University Medical Centre Utrecht on the history of evidence-based medicine, resulting in his PhD thesis *A Doctor's Order: the Dutch Case of Evidence-Based Medicine (1970–2015)*. He is currently based at the Erasmus Medical Centre in Rotterdam and the UMCG in Groningen as Associate Professor of Medical History. His current research includes the history of preventive healthcare ('surveillance medicine'), the 'informatization' of medical science and concepts of health and disease ('informational medicine'), and the contemporary history of mental health care. Email: t.bolt@erasmusmc.nl