LONG-TERM EFFECTS OF PREVENTIVE ACTIVITIES
OF YOUTH HEALTH CARE
FOR SCHOOLCHILDREN IN THE NETHERLANDS

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CHAPTER 1

GENERAL INTRODUCTION

History of youth health care in The Netherlands, a short overview

The foundations of modern school health care date back to the beginning of the last century, when for the first time legislation appeared regarding school building and design. Then, the main focus of interest was improvement of hygienic conditions and in the following decades legislation was repeatedly adapted to changing insights into the impact of school environment on children's health.[1,2] At first, physicians played hardly any role, and supervisory tasks were mainly carried out by local dignitaries or school committees. However, increasing awareness of the role of nutrition and (personal) hygiene in preventing infectious diseases led to several laws and regulations in which physicians were given a more prominent part in school supervision. From 1870 onward, in some major cities general practitioners were expressly charged with child health care at schools. As such they can be considered the first (part-time) school physicians.[1]

When the Compulsory Education Act was introduced in 1901, it was recognised by the authorities that by making education mandatory they were at least in part responsible for the health of the children attending the schools. This eventually resulted in the appointment of the first full-time school physician in 1904 in Zaandam.[1,2] Gradually, other cities followed, but it was the legislation issued during the German occupation in the 1940's that really expedited the evolution of school medical care by compelling municipal authorities to provide medical supervision for all schools.

In the mean time, because of increasing prosperity of the general population resulting in better health by improving nutrition and hygiene, the focus of attention of school medicine shifted from care for nutrition and hygiene to early detection of physical disease and abnormalities. This development towards individual-orientated school health care was further favoured by the fact that school physicians were recruited from professionals trained in curative medicine, and interest in developing screening methods was on the increase.[3,4]

In recent years attention has reverted to some aspects of collective medicine, particularly the promotion of positive health and well-being by health education and collective preventive activities.[5] Nevertheless, youth health care is still very much oriented towards the individual child, and a fundamental change comparable to the one in the early years of school medicine

has not occurred.[4,6] Individual care, notably in the form of repeated well-care visits (also known as periodic or preventive health examinations), is still considered to be the mainstay of youth health care and takes up most of its resources.[7]

Structure and scope of current youth health care

Youth health care (YHC) departments in The Netherlands are part of the Regional Health Services, often working for more than one municipality. They offer programmes to all primary and secondary schools in the region and the take-up by the schools is almost 100%. By the time they leave school, every child in The Netherlands will have been exposed to a wide variety of preventive health and health promotion activities, administered by many different YHC workers. The services are most often rendered on the school premises and may include health promotion programmes, screening for specific physical abnormalities, well-care visits and (freely accessible) consultation hours. For the most part these activities are carried out by YHC physicians, less often by nurses, and medical assistants. Between YHC departments, there is a large variety in the total number, content and intensity of programmes, screening, and well-care visits as well as the availability of consultation hours at schools. This variety is largely due to different views and priorities in the various health care regions with regard to the content of preventive services for children and adolescents.[8,9]

Well-care visits are directed at primary or secondary prevention of physical, behavioural and psychological problems and are offered to all children and adolescents at a certain age or in specific grades. Especially at primary schools, parents are encouraged to accompany their children. At these schools, the take-up by pupils is generally more than 90%, at schools for secondary education somewhat lower, depending on the level of education. The visits last 15 – 20 minutes a student.

Consultation hours are accessible to pupils, parents and teachers, normally without prior appointment. In many cases, they are implemented, because in the early eighties regular well-care visits for the older adolescents (age 16/17 years) were discontinued, often on budgetary grounds. The consultation hours are intended to give easy access to the health care

professionals – in most cases physicians, sometimes nurses – for questions on physical and mental health problems and their prevention. Special training is not obligatory for workers who conduct these consultation hours; additional schooling on top of the basic medical and public health training mainly depends on personal interests.[9]

What sets YHC practice apart from primary and secondary health care, is the fact, that YHC workers, be it physicians or nurses, are not permitted to treat children under their care. If therapy of any sort is deemed necessary, the child must be referred to a general practitioner or other relevant therapist. A similar practice can be found in European countries, such as Germany and Belgium, but on the whole this practice is rather unique when compared to school health services in other countries.

In 1993 – at the end of the period under study in this thesis – YHC departments in The Netherlands employed around 620 physicians, 400 nurses and 420 medical assistants for a total population of 3,100,000 school going children and adolescents in approximately 10,000 schools for primary education, 2,000 schools for secondary education, and 1,200 schools for remedial education.[10] At a cost of about 68 Dutch guilders a child, the total cost of YHC for the 4–19-year-olds that were under care roughly amounted to 210 million guilders. In 1995, these costs were about the same, in part due to a decrease in 4-19-year-olds.[9]

The youth health care workers spent almost 80% of their time on individual care, mainly repeated well-care visits, be it as part of the regular programme or a re-examination because of earlier findings. More than 90% of the YHC departments had a well-care visit planned in the first two years of primary school, more than 70% in later years and more than 85% in the first two years of secondary school.[10]

Background of this thesis

It is debatable whether in a modern Western society such as The Netherlands the focus on the individual-oriented approach is still justified. The health of the youth in The Netherlands ranks among the five highest in the world.[9,11] Also, the prevalence of mental health problems in The Netherlands is comparable to or better than that in other western countries.[12] Apart from that, many diseases warranting early detection and subsequent early preventive treatment are

discovered in the pre-school period of the child's life, during one of the many visits to the health centres for infants and pre-school children.[13] The incidence of disease in later childhood and adolescence is much lower, making an individual approach far less efficient. These considerations have repeatedly led to questions regarding the yield of activities directed at the individual, in particular the repeated well-care visits, starting as far back as 1955.[4,14,15] In recent years, in some instances this has led to the abandonment of well-care visits altogether, to be replaced by collective preventive activities.[16,17]

Working methods of the YHC can differ from county to county and even from one municipality to the other. This diversity in working methods can in part be explained by the fact that in the 1990 Collective Preventive Health Care Act no specific directives are given regarding the contents of youth health care.[18] Current practice is likely to be maintained, given that in a recent publication concerning activities and working methods of YHC for 4 – 19 year olds, the three arguments put forward for establishing or retaining a particular element of YHC are: (a) scientific evidence of effectiveness of the YHC activities, (b) general support by professionals, that is, their conviction that an activity is effective in actual practice, and (c) a perception of high consumer need.[19]

In recent years, the first steps were taken to provide the YHC activities with a scientific underpinning by conducting research into the (long-term) effects. This development is strongly influenced by external pressures brought to bear by state and community (health) officials who demand some kind of evidence for the professed efficiency and efficacy of YHC, as it is practised to date. However, most of the research concerns cost-effectiveness of specific activities – e.g. screening for metabolic disorders (PKU and CHT) or speech-language development – and is mainly directed at health care for pre-school children.[13] In addition, several studies have been published on the technical aspects of screening test and the efficiency of certain screening activities in detecting pre-clinical conditions.[20]

In other countries, such as USA, UK and Australia, similar questions are raised regarding the effectiveness of school health services, the value of (repeated) well-care visits, and in general the contribution of these activities to general health and healthy behaviour of children and

adolescents. Also, the lack of scientific basis for these activities and the urgent need for evaluative studies are emphasised and alternatives are discussed.[21-25]

This thesis aims to assess the long-term health effects of a selection of YHC activities at primary and secondary schools: school screening, well-care visits, and freely accessible ('open') consultation hours at secondary schools. For this purpose several different health (determining) outcomes have been chosen:

♦ surgery for adolescent idiopathic scoliosis;

♦ incidence of (para)suicide;

♦ mental health and general well-being;

♦ lifestyle variables, that is, the use of tobacco, alcohol and drugs, eating habits, and prevalence of obesity.

The purpose of this thesis is to assess whether different approaches to the delivery of health care to young people by the various YHC departments of Regional Health Services are associated with differences in health and health-related behaviour.

It is hypothesised, that (repeated) well-care visits at schools for primary and secondary education and offering easily accessible consultation hours at schools for secondary education will result in better mental health and less health compromising behaviour. Here, better mental health is expressed as a lower incidence of (para)suicide and better scores on mental health questionnaires; improved health related behaviour, in this case, means a lower prevalence of use of tobacco, alcohol and cannabis, improved (self-reported) eating habits and a lower prevalence of obesity.

Further, it is hypothesised, that school screening for adolescent idiopathic scoliosis will result in less surgical interventions for this condition.

Methodological basis

For this study a new study design was introduced, in which the distribution of the determinant among cases from a (national) case register is inferred from the intervention distribution at an

appropriate aggregate level. The distribution among cases is then compared to that in a suitable reference population. This design should provide a reliable post-hoc evaluation of the effectiveness of long standing, community-wide prevention activities, that show effect only after a prolonged period by comparing individual outcomes with a relatively low incidence between populations in regions with different youth health care programmes.

Using this 'ecologic case-referent study design', the effect of screening for scoliosis, well-care visits, and open consultation hours at schools for secondary education on the health outcomes mentioned before was assessed. Where feasible, the referent population comprised the complete relevant census of the Dutch population.

To minimise the chance of introducing a specific kind of systematic error due to idiosyncrasies of a particular registry, data on the selected outcomes were obtained from several national registries:

- the Netherlands Bureau of Statistics (general demographics and data on 227 suicides in the period 1988-1993);
- the National Institute of Public Health and Environmental Protection (general demographics);
- the national hospital discharge register (SIG Services – data on 207 parasuicides admitted to hospital and 182 surgical interventions for idiopathic adolescent scoliosis, both in the years 1990-1993);
- the Netherlands Institute for Budget Information (High-School Students Study – mental health and lifestyle data on a total of 4,997 students);
- the Dutch Institute for Research on Government Spending (data on the distribution of possible confounding variables throughout The Netherlands);
- the Ministry of Defence (data on 12,251 male conscripts in the year 1995).

In addition specific data were acquired from the Spinal Column Study Group of the Dutch Orthopaedic Association, and the Regional Institutes for Ambulant Mental Welfare.

As stated, the study was limited to three major activities of YHC: repeated well-care visits, implementation of open consultation hours and screening for specific physical abnormalities. Information concerning these activities was obtained from every YHC department in The Netherlands, but one.

Outline of the thesis

In four chapters the results of the studies are discussed:

- the effect of school screening for scoliosis on population rates for adolescent scoliosis surgery (chapter 2);

- the influence of offering open consultation hours at schools for secondary education on suicide mortality, hospital admission rates for parasuicide, and incidence of parasuicide among high-school students (chapter 3);

- the influence of the (number of) well-care visits and availability of open consultation hours on mental health problems and general well-being in high-school students (chapter 4), and

- the influence of the (number of) well-care visits and availability of open consultation hours on health determining behaviour such as (self-reported) eating habits, prevalence of use of alcohol, tobacco, and cannabis, and the prevalence of obesity (chapter 5).

In chapter 6 the properties of the newly introduced ecologic case-referent study design are discussed.

Chapter 7 deals with the possible explanations of the results of the four studies and the implications for YHC practice in Dutch Regional Health Services.

In chapter 8, finally, an attempt is made to put the results in a broader perspective and recommendations are made for future research.

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THE EFFECT OF SCHOOL SCREENING

ON SURGERY FOR ADOLESCENT IDIOPATHIC SCOLIOSIS

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Abstract

Study objective – To examine the effect of screening programmes for adolescent idiopathic scoliosis on population rates for adolescent idiopathic scoliosis surgery.

Design – Ecologic case-referent study with data from the national hospital discharge register, youth health care departments in The Netherlands and relevant census.

Setting and Participants – Cases were 182 subjects aged 12 through 19 years, admitted to hospital in The Netherlands for surgical treatment of adolescent idiopathic scoliosis between 1990 and 1993. The total population of 12- or 13-year-olds in the consecutive years of 1987 through 1992 in the regions of the participating youth health care departments served as referents.

Results – Of the 182 patients that had surgery for adolescent idiopathic scoliosis in The Netherlands in the years 1990 through 1993, 37.9% had at one time had a screening for spinal deformities at the age of 12 or 13 years as compared to 37.9% of the referent subjects. The Odds Ratio for cases that had surgery was 1.00 (95% confidence interval 0.74-1.34).

Conclusions – This study does not support the view that screening for adolescent idiopathic scoliosis reduces the population rates for scoliosis surgery. As the primary aim of screening for adolescent idiopathic scoliosis is to prevent surgical intervention, this practice should be reconsidered.

Introduction

For more than two decades nation-wide screening for adolescent idiopathic scoliosis has been practised in a number of countries. However, the results of studies of the effectiveness and efficacy of this screening are still contradictory to such an extent that recommendations vary between countries and organisations.[1-6] The main purpose of nation-wide screening for adolescent idiopathic scoliosis is to reduce the number of scolioses that are sufficiently severe to warrant surgical intervention. Until now, studies have focussed on comparing population rates of surgery and outcomes of non-surgical brace therapy in relation to the severity of scoliosis at presentation before and after introducing nation-wide screening.[7-9] However, this causes uncertainty as to whether changes in surgery rates can be attributed to the screening programme.

In The Netherlands, nation-wide screening for adolescent idiopathic scoliosis was introduced in the early 1980s as part of the regular examination and screening programmes of youth health care (YHC) departments. An agreement about the frequency of screening or appropriate age group was never reached.[4] Some YHC departments screen once as part of regular physical examinations at the age of 14 years (grade 2 of secondary school), while others screen twice by adding a screening in the last grade of primary school (age 12 years) or grade 1 of secondary school (age 13 years). This screening is performed on all primary and secondary schools in the area of a department, as are all other relevant YHC activities. Generally, the uptake of screening is more than 95% at primary schools. In secondary schools this percentage differs between types of education and is generally somewhat lower (around 90%); exact figures are not available.

The screening method most widely used, is the forward bending test (Adam's position). Studies show that it is the most effective and expeditious method for detecting scoliosis.[8,10,11]

The aim of this study was to determine the effect of screening for scoliosis by comparing population rates of surgery for adolescent idiopathic scoliosis between regions with and without an optimal screening programme through a ecologic case-referent study.

Optimal age for screening

Several studies indicate that screening for adolescent idiopathic scoliosis could be useful in preventing progression of the curves by permitting prompt initiation of conservative preventive measures and thereby avoiding complications of advanced scoliosis. That being the case, screening should be conducted at least once. Furthermore, it should be performed at a time when children are the most susceptible to the development of adolescent idiopathic scoliosis. This means that the optimal time for screening is during the growth spurt; approximately the 10-16 years age group.

Apart from that, screening should be conducted at such a time that most if not all developing scolioses will be detected. Moreover, the situation where scolioses that will recover spontaneously and are supervised needlessly, thus causing the child to undergo unnecessary tests and evaluative procedures, must be prevented.[8,12] Studies indicate that these conditions are fulfilled if screening is performed after the age of 11 years because spontaneous recovery is only noted during the early stages of the growth spurt.[3]

Conversely, the time of screening should be such that initiation of non-operative treatment, in particular bracing therapy, is still feasible and worthwhile. Bracing in a child with a progressive scoliosis is only useful before skeletal maturity is reached,[13,14] up to an average skeletal age of 15 years in girls and 17 years in boys.[14] In addition, bracing therapy is more useful at the peak of skeletal growth, which occurs in (Dutch) girls at an age of 9.5-14.5 years (mean age 11.5 years).[10,14] Lastly, research indicates that in only very few cases does progression of scoliosis occur after menarche (in The Netherlands 10-14.5 years; mean 13.1 years).[1,12,15,16] As girls have a greater chance of developing progressive adolescent idiopathic scoliosis and reach skeletal maturity earlier than boys, the upper limit of the optimal age for screening is determined by these lower average ages.

Thus, based on these considerations, screening should be delayed until children are between 12 and 13 years old. Few important curves will be missed and needless roentgenograms will be avoided. Most children will have enough years of growth remaining for treatment with braces to be effective provided the curve is not too severe and early severe curves should usually be picked up apart from screening procedures.[6]

Thus, screening should be performed in grade 8 of primary school or grade 1 of secondary school. Screening in grade 2 of secondary school would be too late, therefore needlessly postponing necessary therapy, which in some cases could render it useless.

Population and methods

To test the hypothesis that regions with an optimal YHC screening programme for adolescent idiopathic scoliosis show lower rates of surgery for adolescent idiopathic scoliosis compared to regions without such a screening programme, a ecologic case-referent study was designed with the total population of either 12 or 13 year olds in The Netherlands in the consecutive years of 1987-1992 as the source population.

Demographic data were obtained from the National Institute of Public Health and Environmental Protection (RIVM) and the Netherlands Bureau of Statistics. The national hospital discharge register (SIG Services) provided data concerning the number of surgical interventions for adolescent idiopathic scoliosis during the years 1990-1993 for each YHC region. These data comprised all 12-24 year old surgery patients in this period and included information on place of residence (postcode), age at surgery, main diagnosis and year in which the surgery was performed.

The Spinal Column Study Group of the Dutch Orthopaedic Association supplied information as to the indications for conservative or surgical treatment of adolescent idiopathic scoliosis in The Netherlands, the consistency of treatment across the hospitals and possible differences in accuracy of coding.

A screening programme for adolescent idiopathic scoliosis was considered optimal when conducted in either grade 8 of primary school or grade 1 of secondary school. YHC departments that performed a screening at an earlier or later age were allocated to the non-screening category.

Of the 63 YHC departments, 62 could be assigned to one of the two categories (screening or non-screening). This allocation was based on annual reports, supplemented with information gained by postal questionnaire and if necessary direct personal contact. One YHC department refused to participate and therefore could not be allocated to one of the two categories.

Of the 22 YHC departments that screened for adolescent idiopathic scoliosis it was determined whether this examination was carried out in grade 8 of primary school (mean age 12 years) or in grade 1 of secondary school (mean age 13 years). Next, to determine the size of the reference population, the total number of 12 or 13 year olds respectively was calculated for these YHC regions. This total represented all children at the age of 12 or 13 years in The Netherlands, which in view of their age, could have been screened for adolescent idiopathic scoliosis in the years designated.

Of the 40 departments that did not screen for adolescent idiopathic scoliosis and thus were assigned to the other determinant category, the total number of 13-year-olds was chosen as the reference population.

Cases were identified from the national hospital discharge register. Each case was allocated by hand to the two screening categories, based on postcode, year of surgery, age of the patient at the time of surgery and YHC code. The distribution of cases was then compared to that of the population of either 12 or 13 year olds in the screening and non-screening YHC regions.

The size of the reference population in the period 1987-1992, that is, the number of 12 or 13 year olds, was calculated to be 413,152 for YHC departments that screened and 676,840 for those that did not.

Data analysis

The data were analysed as a case-referent study, with 182 subjects aged 12-19 years that were admitted to hospital in The Netherlands for surgical treatment of adolescent idiopathic scoliosis between 1990 and 1993 as cases and the total population of either 12 or 13 year olds in the regions of the 62 participating YHC departments between 1987 and 1992 as referents. Odds Ratios were calculated with their 95% confidence intervals.

A separate analysis was performed on a subgroup of 150 cases that had surgery at least 1 year after screening could have taken place and who therefore could have benefited more from the screening programme.

Possible confounding could occur because of an asymmetric distribution of gender across the determinant categories: girls have a higher chance of developing severe progressive adolescent idiopathic scoliosis and at the same time have a somewhat lower uptake of screening than boys, in particular in the age group that is eligible for screening. The Mantel-Haenszel approach was used to adjust for possible confounding by differences in gender distribution between the screening categories. As gender is the only possible confounder in the case of scoliosis, no other variables had to be taken into consideration.

Results

In the years 1987-1992, on average 35% (n=22) of the YHC departments performed a screening for adolescent idiopathic scoliosis.

In the period 1990-1993, 317 operations for scoliosis were performed, of which 249 were for adolescent idiopathic scoliosis and 68 for other types of scoliosis. Because of their age at the time of the operation and the year the operation took place, 62 cases could not have been screened in the 1987-1992 period and were consequently excluded. In five cases the screening category could not be determined. Therefore, after allocating the cases according to year of surgery and age at which surgery was performed, a total of 182 cases of adolescent idiopathic scoliosis (mean age at surgery 14.8 years and SD=1.6 years) remained.

The mean age at surgery of screened cases with adolescent idiopathic scoliosis was 14.5 years (n=69 and SD=1.5 years) and of cases not screened 14.9 years (n=113 and SD=1.7 years). This difference in mean age was not statistically significant (p=0.15).

After excluding cases that had surgery less than 1 year after screening could have taken place, for the subgroup analysis a total of 150 cases of adolescent idiopathic scoliosis (mean age 15.2 years and SD=1.4 years) remained.

Table 2.1 gives an overview of the distribution of cases among the YHC departments in the two screening categories according to the age at which the operation took place.

Table 2.1. Distribution of cases among YHC departments in the two determinant categories according to age at which surgery took place.

age	screening	no screening	TOTAL
12 years	6	7	13
13 years	15	15	30
14 years	14	27	41
15 years	17	25	42
16 years	8	19	27
17 years	7	9	16
18 years	2	10	12
19 years	0	1	1
TOTAL	69	113	182

Table 2.2 shows the Odds Ratio with 95% confidence intervals for the risk of surgery for adolescent idiopathic scoliosis in non-screening YHC departments. The results of the subgroup analysis are also presented in table 2.2.

Table 2.2. Odds Ratios (95% confidence intervals) for surgery for adolescent idiopathic scoliosis in non-screening YHC departments.

	cases	referents	Odds Ratio (95% CI)
all cases (n=182)			
screening	69	413,152	
no screening	113	676,840	1.00 (0.74-1.34)
cases with surgery 1 year after possible screening (n=150)			
screening	58	413,152	
no screening	92	676,840	1.03 (0.74-1.43)

Adjustment for confounding by differences in gender distribution with the Mantel-Haenszel procedure resulted in Odds Ratios and confidence intervals that were exactly the same as those without adjustment. Therefore, an asymmetric distribution of gender across the determinant categories could be ruled out.

Discussion

The major finding of this study is that YHC regions with an optimal screening programme for adolescent idiopathic scoliosis do not show lower rates of surgery compared to regions without

such a screening. Before accepting this finding, some methodological issues need to be addressed.

As this is a registry-based study, several possibilities for misclassification should be considered. First, the information concerning the working methods of the YHC departments could be insufficient or even incorrect. Given the comprehensive method of data gathering, this is considered less likely. The migration of cases between YHC regions can be a second reason for misclassification. However, a major part of internal migration occurs among the older persons in the designated age group and those with severe scoliosis are unlikely to move to another part of the country prior to surgery. A third reason for misclassification could be differences between place of residence (as determined by postcode) and location of the secondary school, by which the YHC region is determined. To mask an otherwise significant difference, however, of the 22 cases that were screened at secondary school and subsequently had surgery more than half would have to be wrongly classified.

Selection bias is also unlikely, because there was no selection of the referent population and the theoretical study base is almost identical to the reference population.

The absolute number of operations seems rather small. This is caused by the fact that only the population of 12 or 13 year olds of the year 1987 can be expected to be almost totally represented, because nearly all operations for adolescent idiopathic scoliosis will be performed before the age of 20 years. Indeed, the proportion of children that had surgery and were in 1987 12 or 13 years of age is approximately 2.5 per 10,000, which is in accordance with expected rates, quoted in the literature.[17] In addition, this makes it unlikely that the results of this study are influenced by a bias introduced because of differences in the follow-up period between cases and the reference population.

One can argue that expecting any positive influence of screening at a time a scoliosis has progressed to such an extent that surgery is required in the same year is unreasonable. Therefore in a separate analysis cases were only included if surgery was performed at least 1 year after screening could have taken place and thus could have benefited more from the screening programme. The resulting Odds Ratio proved to be virtually the same as that of the total group.

It is argued that screening after the age of 13 years (grade 1 of secondary school) is suboptimal. Nevertheless, some hold that screening at the age of 14 years (grade 2) in some cases can still prevent surgery at a later age. However, when comparing those that had a screening to those that did not have any examination for adolescent idiopathic scoliosis, be it as a screening or as part of a regular examination, the Odds Ratio for surgery was virtually the same as that without inclusion of the 14 year olds (Odds Ratio with 14 year olds 0.98, and 95% CI=0.48-1.98).

The main argument for nation-wide introduction of screening for adolescent idiopathic scoliosis is that the scoliosis can be detected in a phase early enough to enable successful conservative treatment. Consequently, severe progression of the scoliosis that makes surgical intervention necessary will be prevented. This study shows no effect of screening for adolescent idiopathic scoliosis on the population rates for adolescent idiopathic scoliosis surgery. As the medical facilities in The Netherlands are very extensive and comparable throughout the country, in particular where treatment of scoliosis is concerned, this factor cannot be of any influence on the results of this study. Therefore, the hypothesis that an active scoliosis screening policy prevents surgical interventions is not supported.

It is unlikely that adolescent idiopathic scoliosis necessitating surgical intervention has a natural history that is different from progressive adolescent idiopathic scoliosis that can be adequately treated with brace therapy alone, if detected early enough. Therefore, it is also unlikely that screening will have a measurable effect in, for instance, ameliorating the daily brace regimen. Moreover, because brace therapy is continued until skeletal maturity has been reached, screening will not affect the total duration of therapy, rather the opposite.

On the basis of these findings we suggest that screening for adolescent idiopathic scoliosis should be reconsidered. To continue screening would represent an unreasonable and disproportionate burden to the already limited resources of preventive health care. Moreover, it can result in mislabelling and, consequently, the inconvenience, financial and emotional cost and potential radiation exposure of needless follow-up evaluations.[5]

As medical care facilities for adolescent idiopathic scoliosis patients in The Netherlands are to a large extent similar to those in other countries, in particular those that have implemented

nation-wide screening programmes or are considering doing so, the results of this study could be of significance for those countries as well.

Acknowledgements

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PREVENTION OF SUICIDE BY YOUTH HEALTH CARE

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Abstract

Study objective – To examine the effect of freely accessible consultation hours at secondary schools by youth health care departments, on population rates for suicide and parasuicide

Design – Ecologic case-referent study with data from the Netherlands Bureau of Statistics, the national hospital discharge register, the High-School Students Study, the youth health care departments in The Netherlands and relevant census.

Setting and Participants – Cases were 137 suicide victims aged 15-19 years and 182 12-18-year-old subjects admitted to hospital because of parasuicide and additionally coded as having had surgery as a consequence of the attempted suicide or having a relevant psychiatric disorder. The relevant census in the regions of the participating youth health care departments served as referents.

The High-School Students Study included 4997 students aged 12-18 years of which 303 reported having attempted suicide at least once.

Results – The adjusted Odds Ratio for completed suicide in regions with open consultation hours was 0.98 (95% CI=0.69-1.38) and the adjusted Odds Ratio for parasuicide was 1.30 (95% CI=0.97-1.75). In the High-School Students Study the Odds Ratio was 0.96 (95% CI=0.72-1.26). The overall homogeneous Odds Ratio for (para)suicide in regions with open consultation hours for all three studies was 1.00 (95% CI=0.97-1.04); the heterogeneous Odds Ratio was 1.08 (95% CI=0.95-1.09).

Conclusions – This study does not support the hypothesis that regions, where youth health care departments offer freely accessible consultation hours at secondary schools, show lower rates of suicide or parasuicide compared to regions that do not.

Introduction

In the last four decades the suicide rate among adolescents has increased much more dramatically than it has in the general population. This rate increase is such that in most Western countries suicide is the second leading cause of death in this age group, only surpassed by death caused by accidents.[1-7] In the past years this has led to an increased interest in the causes of adolescent suicide and possible preventive measures.

The psychological characteristics of adolescents that successfully commit suicide are by definition hard to determine. In general, information is inferred from 'psychological autopsies' of completed suicides.[2,8] In this way a multitude of different underlying causes was found, taking in almost every aspect of human physical, psychological or social functioning.[1,6,8-20] Therefore, primary prevention can only be non-specific – that is, preventive of poor adjustment to his or her family, occupational, and/or social environment.[6] In addition, special attention should be given to youngsters who exhibit one of the five so-called warning signs described by the American Association of Suicidology.[a]

Because of the rate increase, both in The Netherlands and other countries there has been a surge of school-based programmes to prevent adolescent suicide, in some cases in response to startling clusters of suicides or suicide attempts.[21-23] However, these programmes proved to have little effect in for instance changing attitudes of students who had made a previous suicide attempt, clearly the highest risk group.[2,4,7,14,24,25]

Youth health care and prevention of (para)suicide in The Netherlands

Youth health care (YHC) departments in The Netherlands are part of the Regional Health Services, often working for more than one municipality. They offer programmes to all primary and secondary schools in the region and the take-up by the schools is almost 100%. The services are most often rendered on the school premises and may include health promotion

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[a] These signs are: (1) a suicide threat or other statement indicating a desire or intention to die, (2) a previous suicide attempt, (3) depression, (4) marked changes in behaviour, including eating and sleeping patterns, acting out, hyperactivity, (major) substance abuse, or high risk taking behaviour, and (5) making final arrangements or saying goodbye to possessions and/or individuals.

programmes, screening for specific physical abnormalities, well-care visits and (freely accessible) consultation hours. For the most part these activities are carried out by youth health care physicians, less often by nurses, and medical assistants.

Between youth health care departments, there is a large variety in the total number, content and intensity of programmes, screening, and well-care visits as well as the availability of consultation hours at schools. This variety is largely due to different views and priorities in the various health care regions with regard to the content of preventive services for children and adolescents.

With respect to suicide prevention, the differences in access of open consultation hours is of particular interest; because of the diversity of underlying causes and relatively low incidence of (para)suicide, experts[a] agree that, given the working methods of youth health care, only offering open consultation hours can hope to have any effect in reducing (para)suicide rates. Other activities of youth health care departments, such as screening for specific physical abnormalities and well-care visits, are either not easily accessible or strictly related to developmental stage or age of the pupil.

Consultation hours are accessible to pupils, parents and teachers, normally without prior appointment. In many cases, open consultation hours are implemented, because in the early eighties regular well-care visits for the older adolescents (age 16/17 years) were discontinued, often on budgetary grounds. They are intended to give easy access to the Health Care professionals – in most cases physicians, sometimes nurses – for questions on physical and mental health problems and their prevention. Because in freely accessible consultation hours, advice is often actively sought, the impact of individual counselling during these contacts is supposed to be greater than in the more non-specific setting of well-care visits. As regards prevention of suicide and suicidal behaviour, the possibility of easy referral of youths by teachers or student advisors without the risk of stigmatisation is especially important.

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Special training is not obligatory for workers who conduct these consultation hours; additional schooling on top of the basic medical and public health training mainly depends on personal interests. What sets youth health care practice apart from primary and secondary health care, is the fact, that youth health care workers, be it physicians or nurses, are not permitted to treat children under their care. If therapy of any sort is deemed necessary, the child is referred to a general practitioner or other relevant therapist. However, in some cases a restricted number of short counselling sessions may precede (or even replace) referral to, for instance, institutes for mental welfare.

In this study, the potential contribution of open consultation hours in youth health care to the prevention of (para)suicide in adolescents is assessed, using three different data sources. More specifically, three research hypotheses are investigated:

- Suicide mortality rates should be lower in youth health care regions that offer consultation hours, compared to regions that do not. As reporting practices are comparable throughout The Netherlands, these mortality data are considered to be the most reliable.

- The rate of hospital admissions for parasuicide should be lower in youth health care regions that offer consultation hours, compared to regions that do not. As referral and admission practices differ greatly throughout the country, only the more severe cases can be considered reliable enough to include in interregional comparisons.

- The proportion of adolescents that in a health questionnaire report one or more suicide attempts, should be lower in youth health care regions, that offer consultation hours, compared to regions that do not.

Population and methods

Allocation of the youth health care departments in The Netherlands to those with or without open consultation hours at schools for secondary education in the period of 1987-1992 was based on their annual reports, and additional sources when necessary. Only one youth health care department refused to participate.

In 1995 the Dutch Institute for Research on Government Spending published a study in which it was determined, which variables could reliably be used to predict regional differences in

prevalence of psychosocial problems among 0-18 year old youths.[26] The seven variables

chosen (gender, age, degree of urbanisation, proportion of ethnic minorities, percentage of

single-parent families, type of secondary education and percentage of people on social

security) are good predictors for suicide and parasuicide as well, and were consequently used

to balance the regions with respect to differences in the prevalence of psychosocial problems.

This was done by weighting the data with overall-weights for each region, composed of the

weights for each variable for each region. The relevant information was obtained from the

National Institute of Public Health and Environmental Protection and the Netherlands Bureau of

Statistics.

The three different data sources used were the Netherlands Bureau of Statistics, the national

hospital discharge register (SIG Services) and the High-School Students Study from the

Netherlands Institute for Budget Information. Each of these required a different approach.

Mortality rates for suicide

For the mortality data an ecologic case-referent study was designed with the total population of

15-19-year-olds in The Netherlands in the consecutive years 1988-1993 as the source

population. Cases in the population were identified from the mortality statistics of the

Netherlands Bureau of Statistics for the period 1988-1993.

Based on postal code of place of residence, cases were allocated to the youth health care

departments that were divided into two determinant categories. One category included 13

youth health care departments that had consultation hours at schools for secondary education

all through the study period, the other category contained 25 departments that did not have

consultation hours at any year in that period. A remaining group of 23 departments (with

approximately 37% of the total population of 15-19-year-olds and 40% of the suicide victims)

was excluded for one of the following reasons: (a) offering consultation hours in any year later

than 1987 (11 departments) ; (b) consultation hours only held at certain types of schools for

secondary education, not on the school premises, or otherwise not freely and generally

accessible (3 departments); or (c) activities unknown (9 departments). For these reasons a

total of 90 of the 227 cases were not classifiable.

The distribution of the remaining 137 suicide victims over the two determinant categories is compared to that of the relevant census of 15-19 year old youths. The size of the referent population in the period 1988-1993, that is, the total number of 15-19-year-olds was 485,597 for youth health care departments with consultation hours and 876,196 for those without. Odds Ratios were calculated both before and after weighting for possible differences between the two categories in degree of urbanisation, proportion of ethnic minorities, percentage of single-parent families, number and type of facilities for secondary education and percentage of people on social security.

Hospital discharge data

For these data again an ecologic case-referent study was designed with the total population of 12-18-year-olds in The Netherlands in the consecutive years 1990-1993 as the source population. The Institute for Informatics in Health and Welfare (SIG Services) provided data concerning the number of hospital admissions for attempted suicide during the years 1990 through 1993 by youth health care region. Information concerning hospital admissions before 1990 were considered to be less reliable and therefore excluded.

To minimise the effect of the widespread differences in referral practice of physicians and admission policy of hospitals throughout the country, only cases were included that additionally underwent surgical intervention (that is, operating procedures for which hospitalisation was necessary) because of the severity of the resulting injuries and/or were diagnosed with a relevant psychiatric disorder. These disorders were chosen based on their known association with a higher incidence of (para)suicide.[a]
Cases therefore included all 12-18-year-old patients with on discharge a main diagnosis 'attempted suicide' and additionally coded as having had surgery as a consequence of the attempted suicide or having a relevant psychiatric disorder. Also included was information regarding age, year of admittance, gender and postal code of place of residence. The two groups were analysed independently, because cases in the first group are even more likely to

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[a] The following ICD-10 (International Classification of Diseases, 10th edition) codes were included: 291-3, 295-301, 303-5, 307-9, 311-3, and 315-6.

be treated uniformly throughout the country. Consequently, data on the group with severe injuries are more reliable than those on the group with a psychiatric disorder.

Based on the year of admittance, cases were manually allocated to one of the two categories of youth health care departments according to the existence of open consultation hours at least one year before the suicide attempt took place. A total of 19 youth health care departments had open consultation hours at schools for secondary education in the period of 1989-1992 at least one year prior to the registered suicide attempt and 25 departments did not. The remaining group of 17 departments had either instituted consultation hours in the same year as the suicide attempt or their activities were unknown (n=8 and n=9 respectively with approximately 23% of the total population in the relevant age group and 12% of the admissions).

The distribution of the remaining 182 cases over the two determinant categories (youth health care regions with and without consultation hours) was compared to that of the population of 12-18-year-olds. In the period 1990-1993, the total size of the referent population of 12-18-year-olds was 671,192 for youth health care departments with consultation hours and 835,033 for those without. Table 3.1 gives an overview of the distribution of parasuicide cases according to diagnosis group among the categories of youth health care departments.

Table 3.1. Distribution of cases of parasuicide among the youth health care departments.

	consultation hours	no consultation hours	other	TOTAL
parasuicide + surgery	16	15	4	35
parasuicide + psychiatric disorder	65	86	21	172
Total number of parasuicides	81	101	25	207

Odds Ratios were calculated both before and after weighting for possible differences between the determinant categories regarding the six relevant variables mentioned previously.

Separate analyses were carried out for parasuicide patients that during their stay in hospital had had surgery because of their suicide attempt (n=31) and those that were coded as having psychiatric disorders (n=151).

High-School Students Study

In 1992 The Netherlands Institute for Budget Information conducted the High-School Students Study in which more than 11,000 students were asked to complete a questionnaire.[27] This questionnaire included among others questions about age, gender, ethnic origin, type of education, family situation, parental background, education, jobs), and suicide attempts.[a] The questionnaires were completed in the classroom and had a response of more than 95%. A random selection of 50% was made available for this analysis.

As the High-School Students Study data were unevenly distributed among the cities and counties of The Netherlands, the data were standardised for age and gender, based on the population in the respective youth health care departments. The relevant demographic data were obtained from the Netherlands Bureau of Statistics.

Also, data were available from a survey of local preventive activities in 1992 of the Regional Institutes for Ambulant Mental Welfare, aimed at reducing suicidal deaths and suicide attempts by enhancing professional ability of teachers in the recognition of the warning signs mentioned earlier.[28] Therefore, information could be included about preventive activities other than and unrelated to those of youth health care departments.

Based on the school postal code, it was determined which of the students that had answered the relevant questions could have used open consultation hours and whether the school as a whole could have benefited from the Mental Welfare activities.

The data were analysed as an ecologic case-referent study with 4,997 students aged 12-18 year as subjects of which 1,983 could have visited open consultation hours and 3,014 could not. Table 3.2 gives an overview of the distribution of the number of students among the youth

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[a] Question: 'Did you ever seriously attempt to put an end to your life?' (possible answers: 'never', 'once', 'more than once')

health care departments in the two determinant categories, before and after standardisation for age and gender.

Table 3.2. Total number of students with and without reported suicide attempts per determinant category (High-School Students Study).

	consultation hours		no consultation hours		TOTAL	
	unstand.	standardised*	unstand.	standardised*	unstand.	standardised*
1 (or more) suicide attempt(s)	84	119	219	153	303	272
no suicide attempts	1,899	2,410	2,795	2,270	4,694	4,680
TOTAL	1,983	2,529	3,014	2,423	4,997	4,952

* standardised for age and gender, based on the population in the respective youth health care departments

In a dichotomous variable the answers 'once and 'more than once' were combined into one category. With this variable as dependent, in a logistic regression procedure the influence of having access to open consultation hours on the incidence of parasuicide was determined. Apart from the variable 'consultation hours', the following variables were included in the regression equation: age, gender, ethnicity, grade, type of education, family situation, parental work situation, degree of urbanisation of place of residence of the subject and Mental Welfare activities. Variables were added and retained in the model only when inclusion resulted in a substantial change (> 5%) in the Odds Ratio for the determinant under consideration.

Overall Odds Ratio

Based on the weighted Odds Ratios for suicide, hospital admission for parasuicide and reported parasuicide, both a homogeneous and heterogeneous overall Odds Ratio was calculated using the method described for computing overall Odds Ratios for meta-analyses.[29]

Results

Table 3.3 shows the Odds Ratios with 95% confidence interval for the risk of completed suicide in youth health care departments with and without freely accessible consultation hours both before and after the weighting procedure. An Odds Ratio of more than 1.00 signifies an adverse effect.

Table 3.3. Odds Ratios (95% confidence intervals) for suicide in youth health care departments with freely accessible consultation hours.

	cases	weighted* cases	referents	OR (95% CI)	adjusted OR (95% CI)
consultation	52	49	485,597		
no consultation	85	90	876,196	1.10 (0.78-1.55)	0.98 (0.69-1.38)

* weighted for differences in degree of urbanisation, proportion of ethnic minorities, percentage of single-parent families, number and type of facilities for secondary education and percentage of people on social security.

No effect of open consultation hours could be measured (adjusted Odds Ratio=0.98, 95% CI=0.69-1.38). In a further analysis, the sensitivity of the study was estimated by adding all 90 non-classifiable cases with their referent population to the screening category. The resulting Odds Ratio was 1.36 (95% CI=1.04-1.77). When added to the non-screening category, the Odds Ratio was 0.77 (95% CI=0.56-1.05).

Table 3.4 shows the crude and adjusted Odds Ratios with 95% confidence interval for the risk of hospital admission due to parasuicide in the two categories of youth health care departments. Overall, no effect could be measured (adjusted Odds Ratio=1.30, 95% CI=0.97-1.75), but in the case of parasuicide with concomitant surgery the risk in regions with open consultation hours was significantly higher (adjusted Odds Ratio=2.59, 95% CI=1.30-5.16).

Table 3.4. Odds Ratios (95% confidence intervals) for parasuicide in youth health care departments with freely accessible consultation hours.

	cases	standardised* cases	referents	OR (95% CI)	adj. OR (95% CI)
hospital admission for parasuicide and surgery					
consultation	16	25	671,192		
no consultation	15	12	835,033	1.33 (0.66-2.68)	2.59 (1.30-5.16)
hospital admission for parasuicide and psychiatric disorder					
consultation	65	64	671,192		
no consultation	86	73	835,033	0.94 (0.68-1.29)	1.09 (0.78-1.53)
all hospital admissions for parasuicide					
consultation	82	89	671,192		
no consultation	101	85	835,033	0.99 (0.73-1.43)	1.30 (0.97-1.75)

* standardised for age and gender, based on the population in the respective youth health care departments

Regarding the High-School Students Study, in the final logistic regression model the following variables were found to have a statistically significant influence: gender, age, grade, type of education, family situation, parental work situation, degree of urbanisation of the place of residence of the subject and preventive activities of the Mental Welfare organisations. No effect could be demonstrated for open consultation hours (adjusted Odds Ratio=0.96, 95% CI=0.72-1.26), whereas the preventive activities of the Mental Welfare organisations did have a positive influence (adjusted Odds Ratio=0.60, 95% CI=0.44-0.81). Exclusion of the variable 'Mental Health activity' did not significantly change the Odds Ratio of open consultation hours, so a confounding influence of this variable is not likely.

The overall homogeneous Odds Ratio was 1.00 (95% CI=0.97-1.04); the heterogeneous Odds Ratio was 1.08 (95% CI=0.95-1.09). The test for homogeneity resulted in a chi-square of 3.06 (DF=2, p > 0.10).

Discussion

This study does not support the hypothesis that regions where youth health care departments offer freely accessible consultation hours at secondary schools, show lower rates of suicide or parasuicide compared to regions that do not.

Each of the three data sets and their analyses present their own difficulties and methodological issues.

In the case of the analysis of the mortality and hospital admission rates, when comparing the distribution of cases between the two determinant categories the danger mainly lies in misclassification of subjects. Indeed, the information concerning the working methods of the youth health care departments could be insufficient or even incorrect. Given the comprehensive method of data gathering however, this is less likely. Internal migration can be a second reason for misclassification of cases and can have led to some dilution of the effect. A third reason for misclassification can be a difference between place of residence and place of the secondary school and therefore, in some cases, the youth health care region.

It should be stressed that in all of these instances misclassification of cases is nondifferential. Differential misclassification is very unlikely in this type of study. The same applies to selection bias, because there was no selection of a referent population and the theoretical study base is almost identical to the reference population.

In most cases, consultation hours were instituted in response to budgetary cutbacks, because of which well-care visits in grade 4 of the secondary schools had to be discontinued.

Therefore, selection by indication – for instance when instead, consultation hours are offered in response to a higher incidence of (para)suicide or higher prevalence of mental health problems in general – is not likely.

For the *mortality figures* the starting year is 1988, because the institution of consultation hours will not be effective immediately after implementation. It will take at least a year for them to become an accepted extension of youth health care practice. Therefore, any influence on outcome variables can only be expected after that. As information concerning working methods of youth health care departments was available from 1987 onward, 1988 was the earliest year usable.

Because no youth health care departments discontinued consultation hours once they were instituted, it was considered safe to include 1993. This is supported by the fact that the Odds Ratios over the years 1988-1992 are exactly the same as those over the period 1988-1993. The youth health care services that could not be assigned to one of the two categories were evenly distributed across the country and on average did not differ from the services in the two categories in respect to the six relevant variables mentioned before (p=0.66). This is substantiated by a further analysis, in which all 90 cases with their referent population were added to one or the other determinant category. This analysis showed, that even in the highly unlikely event, that all non-classifiable cases could be allocated to the non-screening category, no positive influence of open consultation hours could be demonstrated.

It is clear that the 15-19 year age band will not be totally covered by youth health care activities. The age group most likely to benefit is 18 years old or less. Even so, as mentioned previously, in this type of study selection bias can safely be ruled out. Furthermore, the

mortality figures are corrected for possible differences regarding the various relevant variables. Therefore, cases older then 18 years of age will have been equally distributed between the two determinant categories. It is unlikely that misclassification will have masked an otherwise significant difference.

For the *hospital discharge data* the starting year was 1990, because information on the preceding years was considered to be less reliable; in the years prior to 1990 not all hospitals supplied (complete) data. The rationale for including 1993 is mentioned above, and again the Odds Ratios over the years 1990-1992 were comparable to those over the period 1990-1993. The two diagnosis groups on discharge – parasuicide with severe trauma requiring surgery, and parasuicide with a relevant psychiatric disorder – were analysed separately because cases belonging to the first category are most likely to be treated uniformly across the country. Therefore, Odds Ratios computed for this category are more reliable. As such the resulting Odds Ratio indicating that in regions with consultation hours the rates for hospitalisation because of severe trauma due to parasuicide is significantly higher – even for these small numbers – is not particularly encouraging. Clearly, further studies are necessary to determine the significance of this finding.

Due to the widespread differences in referral practice of physicians and admission policies of individual hospitals, the discharge data on cases other than belonging to the two diagnosis groups are considered to be unreliable. This of course is unfortunate, because those cases will constitute a substantial and from the viewpoint of prevention a potentially very important group.

Most of the methodological problems described above are not applicable to the analysis of data from the *High-School Students study*. As the data were standardised for age and gender, based on the population of the respective youth health care departments and in the basic logistic regression model the various relevant variables were included, it is hard to ascribe possible differences between the two determinant categories to anything other than the existence of open consultation hours. As the uneven distribution of subjects among cities and counties was due to differences in ease of access to schools and geographic preferences and

not to variations in incidence of (para)suicide, this will not have led to differential misclassification.

Apart from that, the effect, if any, of nondifferential misclassification seems to be small, given that a much more equivocal and general variable – the regional school-oriented preventive activities of Mental Welfare organisations – does prove to have a significant positive effect on the prevention of parasuicide. Thus, this variable can more or less be considered as a control for the sensitivity of the study. Also, it suggests a possibly more effective approach regarding the prevention of (para)suicide than offering consultation hours. Furthermore, nondifferential misclassification because of a difference between place of residence and place of the secondary school is not possible as in this case the postal code of the school is used for allocation.

By combining the results in one overall Odds Ratio the importance of possible methodological shortcomings of the three separate studies is further reduced.

Conclusion

From the individual Odds Ratios and the overall Odds Ratio it is concluded that maintaining open consultation hours by youth health care departments does not contribute to the prevention of suicide or parasuicide.

Further studies are necessary to determine the implications of the unexpected adverse Odds Ratio for hospitalisation for parasuicide with surgery in regions with open consultation hours. Also, new and/or different approaches should be considered concerning the prevention of (para)suicide. In this respect, the positive effect of the Mental Welfare activities can be considered an interesting and valuable starting point.

Acknowledgements

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PREVENTION OF MENTAL HEALTH PROBLEMS BY YOUTH HEALTH CARE

Submitted for publication

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Abstract

Study objective – To examine the effect of (repeated) well-care visits and freely accessible consultation hours at secondary schools on prevalence of adolescent mental health problems and present state of mind.

Design – Ecologic case-referent study with data from the High-School Students Study, and the youth health care departments in The Netherlands.

Setting and Participants – The study included 4,592 students aged 12-18 year of which 3,673 had answered all 33 questions on a mental health questionnaire and 4,140 had answered the two questions about present state of mind.

Results – The Odds Ratio for mental health problems as measured by the questionnaire was in case of adolescents having access to open consultation hours 0.90 (95% CI=0.74-1.09), when they had experienced more well-care visits 1.02 (95% CI=0.84-1.24) and when the well-care visit had taken place more recently 0.96 (95% CI=0.87-1.05). The Odds Ratios for an adverse state of mind were 1.15 (95% CI=0.93-1.42) in case of having access to open consultation hours, 0.92 (95% CI=0.74-1.14) when experiencing more well-care visits, and 1.00 (95% CI=0.90-1.11) when well-care visits had taken place more recently. In all cases an Odds Ratio > 1.00 signifies an adverse effect.

Conclusions – This study does not support the hypothesis that on a population level, preventive activities of youth health care departments such as (repeated) well-care visits or institution of open consultation hours at secondary schools, have a beneficial effect on the prevalence of mental health problems in adolescents.

Introduction

With prevalence figures of serious mental health problems in general population samples of children and adolescents varying between 17% and 22%, there can be no doubt that prevention of these problems is of great importance. This is further emphasised by the fact that only a fraction of adolescents with severe mental health problems actually receives therapy.[1-5] Partly, this is because adolescents primarily turn to family members, friends, trusted adults, and school personnel for help in these matters. Only if these resources fail, do they consult (school-based) health services or clinicians.[6-10] Studies of the utilisation of these facilities in the USA show that nevertheless 25% of the adolescents presents with problems related to mental health, so a much higher prevalence is not unlikely.[2,11,12] Prevention and subsequent treatment are further hindered by the fact that recognition of mental health problems is hardly straightforward. In a survey of the prevalence of psychiatric disorders in Dutch adolescents, 21% were diagnosed with a disorder as defined by the DSM-III-R, but more than two thirds of these adolescents functioned quite well.[13,14] Also, adolescents often present with vague somatic complaints when actually seeking help on psychological or psychiatric problems, making recognition even harder.[4,15]

The importance of early effective preventive or therapeutic interventions is emphasised by the results of an eight-year longitudinal study of children and adolescents in The Netherlands. The study showed, that childhood problems tend to persist into young adulthood, even those that are usually thought to be age dependent, such as attention disorders and hyperactivity.[1,14,16] Other longitudinal studies show comparable results.[17,18]

As the cause of mental health disorders can often be found in early childhood development,[19] educational programmes and other efforts to prevent development of mental health problems are introduced on an increasingly wider scale. To the same purpose, several child and adolescent health organisations[a] recommend repeated well-care visits, at least every two to three years. In this way (both physical and) mental health problems should be detected early

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[a] Guidelines Adolescent Preventive Services (GAPS): annual preventive visit for adolescents 11–21 years; US Preventive Services Task Force (USPSTF): preventive visits every 2 or 3 years for adolescents up to age 21; American Academy of Pediatrics: well-care visit every 2 years for adolescents up to age 20.

enough for preventive actions to be effective. However, the main focus of these visits is on prevention of other than mental health problems, and thus little time is spent on mental health preventive actions.[11] Also, the lack of proficiency of the health care professional,[2,20] and the reluctance of adolescents to communicate mental health problems to (school) physicians,[6-10] will lessen the effect. Apart from that, it has been estimated that even in the most cost-efficient model a reduction of at least 15% of adolescent morbidity is necessary to outweigh the economic investment.[21] Furthermore, studies on the impact of these programmes are relatively sparse and hampered by unclear and frequently changing definitions.[22,23]

Prevention of mental health problems by youth health care in The Netherlands

Youth health care departments in The Netherlands are part of the Regional Health Services, often working for more than one municipality. They offer programmes to all primary and secondary schools in the region and the take-up by the schools is almost 100%. Since the first school-based youth health care activities were initiated in The Netherlands – more than a century ago – the youth health care has grown into a nation-wide, labour-intensive service, employing hundreds of physicians, nurses and medical assistants. By the time they leave school, every child in The Netherlands will have been exposed to a wide variety of preventive health – and health promotion activities, administered by many different youth health care workers. The services are most often rendered on the school premises and may include health promotion programmes, screening for specific physical abnormalities, well-care visits and (freely accessible) consultation hours. For the most part these activities are carried out by youth health care physicians, less often by nurses, and medical assistants. Between youth health care departments, there is a large variety in the total number, content and intensity of programmes, screening, and well-care visits as well as the availability of consultation hours at schools. This variety is largely due to different views and priorities in the various health care regions with regard to the content of preventive services for children and adolescents. Well-care visits are orientated towards primary or secondary prevention of physical, behavioural and psychological problems and are offered to all children and adolescents at a certain age or in specific grades. Especially at primary schools, parents are encouraged to

accompany their children. At primary schools, the take-up by pupils is generally more than 90%, at schools for secondary education somewhat lower, depending on the level of education. The visits last 15 – 20 minutes a student.

The personal contact during well-care visits provides the possibility of giving individualised advice to parents, children and/or adolescents. Because of this personal approach, advice given during visits is supposed to be more effective than the often-unsolicited advice given in, for instance, education programmes or health promotion campaigns.

Consultation hours are accessible to pupils, parents and teachers, normally without prior appointment. In many cases, open consultation hours were implemented, because in the early eighties regular well-care visits for the older adolescents (age 16/17 years) were discontinued, often on budgetary grounds. They are intended to give easy access to the Health Care professionals – in most cases physicians, sometimes nurses – for questions on physical and mental health problems and their prevention. Because in freely accessible consultation hours, advice is often actively sought, the impact of individual counselling during these contacts is supposed to be greater than in the more non-specific setting of well-care visits.

Special training is not obligatory for workers who conduct these consultation hours; additional schooling on top of the basic medical and public health training mainly depends on personal interests.

What sets youth health care practice apart from primary and secondary health care, is the fact, that youth health care workers, be it physicians or nurses, are not permitted to treat children under their care. If therapy of any sort is deemed necessary, the child must be referred to a general practitioner or other relevant therapist. However, in some cases a restricted number of short counselling sessions may precede (or even replace) referral to, for instance, institutes for mental welfare. This practice seems to be unique when compared to school health services in most other countries.

In the past years, not only the frequency of contacts has changed but also the content. Especially the last two decades have seen profound changes in the way school-based youth health care services are conducted, in many instances necessitated by budgetary cutbacks. Furthermore, a shift in attention from physical to mental health problems required a

fundamental change in the content of prevention activities and in the professional attitude of youth health care workers.

Examples, however, of changes brought about on scientific grounds or due to outcomes of evaluative health services research, are rare. This is especially true for the total number of well-care visits, the content of these visits, the institution of freely accessible consultation hours at schools for primary or secondary education, health promotion activities and the like.

Youth health care still relies heavily on personal contact, physical examination and individualised advice for the prevention of physical, behavioural and psychological problems in children and adolescents. However, the effectiveness of this approach is not substantiated by any evaluative research.

Part of the rationale for implementing school-based activities is, that by frequent individual contacts, be it during screening, well-care visits or consultation hours, (conditions inducing) mental health problems will be detected earlier so that prompt and expert help can be initiated at a stage where prevention is still possible. Since childhood and adolescent mental health problems generally tend to persist,[16-18,20] the more individual contacts, the more chance of early detection and thus early treatment. But again, no studies are available to support this assertion.

In other countries, such as USA, UK and Australia, similar questions are raised regarding the effectiveness of school health services, the value of (repeated) well-care visits, and in general the contribution of these activities to general health and healthy behaviour of children and adolescents. Also the lack of scientific underpinnings for these activities and the urgent need for evaluative studies are emphasised and alternatives are discussed.[24-28]

The purpose of this study is to determine whether a greater number of well-care visits, a shorter period since the last visit, and/or the availability of freely accessible ('open') consultation hours at schools for secondary education result in better scores on mental health scales and a better overall present state of mind.

Population and methods

In 1992 The Netherlands Institute for Budget Information conducted the High-School Students Study. More than 11,000 students were asked to complete a questionnaire, which included 40 questions concerning mental health status and two questions about present state of mind (see the appendix for an overview of these questions).[29]

The questionnaires were completed in the classroom in 1992, at the beginning of the new school year, and had a response of more than 95%. A random selection of 50% was made available for this analysis.

Based on postal code of the school, it was determined to what youth health care department the students had to be allocated.

Based on a report of the Dutch Institute for Research on Government Spending on regional differences in prevalence of psychosocial problems among 0-18 year olds,[30] from the questionnaire the following co-variables were selected for inclusion in the regression models as independent variables: ethnic origin, type of education, family situation, parental occupational status and degree of urbanisation of the place of residence of the subject.

The total number of well-care visits by youth health care physicians and/or nurses, the grades or years in which they were planned and the availability of open consultation hours at schools for secondary education in the period of 1987-1992 were determined on the basis of annual reports of all Dutch youth health care departments, if necessary supplemented by personal inquiries. Only one youth health care department refused to participate. For each student in a certain grade at the time of the survey, the number of well-care visits he or she was exposed to, the number of years since the last visit, and the availability of open consultation hours was assessed (table 4.1)

Table 4.1. Total number of students per number of well-care visits and availability of open consultation hours.

	consultation hours	no consultation hours	undetermined	TOTAL
no visits	235	45	0	280
1 visit	696	993	170	1,859
2 visits	1,124	785	415	2,324
3 visits	31	98	0	129
TOTAL	2,086	1,921	585	4,592

Of the two possible answers on the 40 questions on mental health (agree/disagree), answers signifying a negative opinion were rated one point, positive answers were rated as zero. After reliability testing seven questions were not included in the mental health scale, leaving 33 questions (Cronbach's Alpha= 0.85, see Appendix).

To gain contrast on the outcome variable, only students scoring within the lowest quartile of the sumscore on the mental health scale (that is, having a better mental health; referents) and those that scored within the highest quartile (that is, having a worse mental health; cases) were included in the analysis.

The same procedure was followed with the variable 'present state of mind': students who reported to be in a (very) good mood and doing (very) well were considered referents and students that answered negatively on both questions were considered cases.

Table 4.2 gives an overview of the distribution of the number of cases and referents for the two outcome variables according to number of well-care visits and availability of open consultation hours.

Table 4.2. Number of students (with row percentages) per number of well-care visits, and availability of open consultation hours for each of the outcome variables.

	mental health sumscore		present state of mind	
	> 75% (*cases*)	< 25% (*referents*)	(very) bad (*cases*)	(very) good (*referents*)
number of well-care visits				
no visits	58 (48%)	64	29 (14%)	181
1 visit	445 (53%)	403	193 (13%)	1,254
2 visits	514 (52%)	480	254 (14%)	1,559
3 visits	30 (56%)	24	9 (9%)	93
availability of consultation hours				
no consultation hour	451 (54%)	391	194 (13%)	1,295
consultation hour	456 (48%)	487	228 (14%)	1,429

For each outcome variable, two logistic regression models were fitted to estimate the effect of having access to open consultation hours (model 1), and of the total number of well-care visits and the time elapsed since the last of these visits (model 2) conditional on the co-variates (age, gender, ethnicity, grade, type of education, family situation, parental occupational status, degree of urbanisation). The following interaction terms were also included: parental occupational status and ethnicity, type of education and ethnicity, and type of education and grade. Variables were added and retained in the model only when inclusion resulted in a substantial change (> 5%) in the Odds Ratio of the determinant under consideration. When an interaction term was included, in the final model the constituent variables were also included.

Results

In four different logistic regression procedures the effect of having access to open consultation hours and of the total number of well-care visits plus the number of years since the last of these visits on the probability of a negative 'mental health' or 'present state of mind' was estimated.

Table 4.3 gives an overview of the Odds Ratios of the dependent variables with their 95% confidence intervals before and after introduction of the confounding variables. Only the variables 'grade' and 'type of education' appeared to cause confounding, as inclusion of these factors resulted in a substantial change in the regression coefficients of the determinants under consideration. All other variables effected a change of 5% or less. An Odds Ratio larger than 1.00 indicates an adverse effect of the determinant under consideration. All but one of the Odds Ratios failed to show a significant effect of the determinants on the outcome variables (table 4.3).

Table 4.3. Odds Ratios (95% confidence intervals) for adverse mental health and state of mind in case of having access to open consultation hours, more frequent, and more recent well-care visits, before and after introduction of confounding variables (OR > 1 signifies an adverse effect).

		adverse mental health	adverse state of mind
open consultation hours	crude OR	0.81 (0.67-0.98)	1.07 (0.87-1.31)
	adj. OR	0.90 (0.74-1.09)*	1.15 (0.93-1.42)*
number of well-care	crude OR	0.97 (0.80-1.17)	0.88 (0.71-1.09)
visits	adj. OR	1.02 (0.84-1.24)**	0.92 (0.74-1.14)**
number of years elapsed	crude OR	1.05 (0.96-1.15)	1.07 (0.97-1.19)
	adj. OR	0.96 (0.87-1.05)**	1.00 (0.90-1.11)**

*   after introduction of variable 'type of education'
** after introduction of variable 'grade'

The only exception appeared to be a positive influence of open consultation hours on adverse mental health, but after correction for confounding this effect became smaller and not significant. Further analysis showed, that only students of schools for lower vocational education could possibly benefit from open consultation hours. Of those that had access to open consultation hours 60% scored in the top 25% of the mental health scale (cases) against 74% of those without. The Odds Ratio of consultation hours, when comparing mental health of

students of schools for lower vocational education to that of students of all other types of schools, was 0.81 (95% CI=0.63–1.04).

In a further exploration of possible effects of the youth health care activities on mental health, Spearman correlations were calculated between the three youth health care determinants and the 33 items of the mental health scale. In all cases, especially items denoting confidence and self-reliance seem to be adversely affected by increased efforts on the part of the youth health care departments. After factor analysis with varimax rotation two subscales were identified in which most of these items were represented (11-item scale 'fear and insecurity' Cronbach's Alpha=0.75, and 8-item scale 'confidence and self-image', Cronbach's Alpha=0.71). Again, none of the three youth health care determinants had a significant influence on the two subscales. Furthermore, only the influence of open consultation hours tended to be favourable.

Discussion

This study does not support the hypothesis that (more) frequent well-care visits or the institution of open consultation hours at secondary schools, have a beneficial effect on the prevalence of mental health problems.

Before accepting these findings however, several methodological issues need to be addressed.

With respect to misclassification, given the comprehensive method of data gathering, the information concerning the working methods of the youth health care-departments is of high quality. As stated in the introduction, the content of well-care visits, especially in regard to diagnosis of and advice concerning mental health problems, can vary per department and youth health care worker. Studies show, however, that in general the considerable differences are due more to inter-physician variations than differences between the various centres.[31] Internal migration has probably led to some misclassification on the determinants, as it was not possible to ascertain which students had moved to other youth health care regions and therefore could have been to other youth health care working methods. Therefore, some dilution of the effect due to this misclassification might have occurred.

Generally, attendance at well-care visits is more than 85% and often reaches 95% at schools for higher general secondary or pre-university education. Failing to appear due to illness will generally lead to a call up later that year or the following year, so the total number of visits will eventually be the same. Nevertheless, students from a lower social-economic background and of those more often the girls, fail to appear relatively more often. The same can be said when non-attendance is caused by truancy, although in that case it more often concerns boys.

Conclusion

It is concluded that on the population level a contribution of the Dutch youth health care departments to prevention of mental health problems among adolescents by offering one or more visits to youth health care workers cannot be demonstrated. Only students of schools for lower vocational education could possibly benefit from open consultation hours, at least as far as their mental health is concerned.

These results are surprising as the expectation with respect to the effectiveness of these programmes is high, and nowadays prevention of mental health problems is considered to be one of the main targets for youth health care activities in this age group.

Further studies are urgently needed to inquire into the reasons behind this lack of demonstrable effects. In the mean time, other methods for prevention of mental health problems among adolescents, within or outside the context of youth health care, should be developed. Leaving the activities unchanged would represent an unreasonable and disproportionate burden to the already limited resources of Preventive Health Care. In addition, this study stresses the importance of proper evaluation of any programme directed to prevent mental health problems among adolescents.

Acknowledgements

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Appendix

Questions on mental health (possible answers: I agree, I disagree). Questions marked with *
are not included in the mental health scale. Questions marked with [1] are included in the 11-item
subscale 'fear and insecurity', and questions marked with [2] are included in the 8-item subscale
'confidence and self-image'.

1* I like going to school.

2* I like being at school.

3 I don't like being at home.

4 I often feel lonely.

5* I think it is very exciting to do dangerous things.

6 I often feel gloomy.

7[2] In general I am quite satisfied with myself.

8[2] I don't feel that I can be proud of myself.

9[2] In many things I am as good as most others.

10[2] Sometimes I think, I will never be able to do anything right.

11[2] I often feel that everything I do is wrong.

12* It is a good thing to go to school.

13[2] I generally feel good about myself.

14 People like me have little opportunity to succeed in life.

15 I cannot get along with my father very well

16 I really feel the lack of a good friend.

17 Often I have the feeling nobody cares about me.

18 In general I get along very well with other children my age.

19 I often get bullied by children my age.

20 I easily make friends.

21 I cannot get along with my mother very well.

22* When I go out I usually carry a weapon.

23[2] I am not satisfied with my looks.

24[2] I think others find me unattractive.

25 I often get bored when I'm not at school.

26[1] I wish I had more hobbies.

27 I feel I have no control over my own life.

28[1] I feel very uncertain when I have to make a decision.

29[1] I am often afraid to fail.

30[1] I often feel afraid to be on the street.

31[1] I quickly get anxious when things don't turn out the way I expect them to.

32[1] In company I often feel insecure.

33[1] I quickly feel let down.

34[1] Sometimes I get very afraid without reason.

35[1] I often have nightmares.

36 I can get so angry that I lose all control.

37[1] I often find it hard to express my feelings.

38* I tend to check the things I do over and over again.

39* Often I am more meticulous than is strictly necessary.

40[1] When I am tense I tend to develop physical complaints (headache, stomach-ache, nausea)

Questions on present state of mind:

I All in all, how would you like to describe your present mood? (very good, good, not too good, rather depressed, very much depressed)

II All things considered, how are you doing now? (very good, good, reasonably well, fair, bad, very bad)

PREVENTION OF UNHEALTHY BEHAVIOUR BY YOUTH HEALTH CARE

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Abstract

Study objective – To examine the effect of (repeated) well-care visits and freely accessible consultation hours at secondary schools on prevalence of adolescent health compromising behaviour and later obesity.

Design – Ecologic case-referent study with data from the Netherlands Bureau of Statistics, the Ministry of Defence, the 1992 High-School Students Study, the youth health care departments in The Netherlands and relevant census.

Setting and Participants – The data from the High-School Students Study included 4,569 students aged 12-18 year of which 4,167 had answered all questions on health behaviour: use of alcohol, tobacco and cannabis, and eating habits. The data from the Ministry of Defence included 1,004 cases with a Body Mass Index (BMI: weight(kg)/height(m)^2) higher than 27 of a total of 12,251 male conscripts. The relevant census in the regions of the participating youth health care departments served as referents.

Results – As for the High-School Students data, except for the use of alcohol the effect of a greater number of well-care visits was in all cases negative, and for the use of tobacco even significantly so (Odds Ratio=1.15, 95% CI=1.01-1.33). The influence of the number of years elapsed since the last visit was varied and in all cases not significant.

The availability of open consultation hours had a significantly adverse effect on use of alcohol (Odds Ratio=1.29, 95% CI=1.11-1.50). Eating habits on the other hand were favourably affected, although not significantly so (Odds Ratio=0.91, 95% CI=0.80-1.04).

The Odds Ratio for obesity in conscripts showed an adverse effect of a greater number of well-care visits (three visits compared to one; Odds Ratio=2.46, 95% CI=1.74-3.46) and the availability of open consultation hours (Odds Ratio=1.97, 95% CI=1.72-2.25).

Conclusions – It is concluded, that this study does not support the hypothesis that on a population level, preventive activities of youth health care departments such as (more) frequent well-care visits or offering open consultation hours at secondary schools, have a beneficial effect on unhealthy behaviour or obesity .

Introduction

In the face of increasing substance abuse, physical inactivity with concomitant obesity and other forms of health compromising behaviour among adolescents,[1-4] the initial confidence about the ability to influence adolescent lifestyle and thereby later health has gradually become more realistic. Until recently, prevention programmes primarily aimed at increasing knowledge, rather than influencing behaviour. However, many studies have shown that the link between knowledge, attitudes, and behaviour is tenuous, and that increased knowledge does not necessarily lead to a change in behaviour. Empirical evidence moreover, has consistently shown the ineffectiveness of programmes focussing on increasing knowledge, and some were even associated with increased drug use by stimulating students' curiosity.[5,6] Many drug-use prevention programmes have relied almost exclusively on ads or public service announcements to impact attitudes and behaviour. Evaluative research is frequently non-existent, strategy is not well formulated and audience segmentation is forgone.[7] Even high-profile and costly programmes, such as DARE (Drug Abuse Resistance Education) in the USA showed only limited effect on preventing drug abuse, if at all, but are nevertheless continued because they are highly valued by society.[6,8,9] Moreover, messages about healthy lifestyles are confusing and often conflicting,[2,10] leading to behaviour often contrary to what was intended by the health promotion professionals.[5,10,11]

The many aspects of unhealthy behaviour are highly interrelated,[12,13] and have numerous risk factors in common.[14-18] Therefore, programmes using multimodal approaches and focussing on for instance the least advantaged segments of the community seem to be more successful.[7,16,19,20] As evidence suggests that risky behaviour starts early and tends to persist well into adulthood, preventive measures and programmes should be implemented at a far earlier age than is now customary.[2,5,14,17,18,21-25] This is especially true for prevention of obesity, as treatment in adults has been shown to be largely ineffective and dietary treatment of children and adolescents is complicated by possible interference with growth.[4]

It is widely recognised that, although health education at schools is important as a basis for informed decision making about (future) health behaviour, only population-wide efforts with commitment from teachers, parents, peers and the community as a whole can potentially

contribute to the prevention of substance abuse and other forms of health compromising behaviour.[1,3,5,6,9,26-28] Even though social influence and life skills training programmes show limited usefulness in preventing substance abuse,[6] there is increasing evidence that social factors are more important than personal attitude, and that within-group processes (such as peer influence) are considerably more important than personal factors (such as self-esteem).[14,17,29] But even when programmes take into account as much of these factors as possible, long-term results are hardly favourable.[30-32]

Although there are some minor differences, developments in The Netherlands are virtually the same as those in other western countries, both in regard to the increase in substance abuse as to the (discussion with respect to the) development, implementation and effectiveness of prevention programmes.

Prevention of unhealthy behaviour and obesity by youth health care in The Netherlands

Youth health care (YHC) departments in The Netherlands are part of the Regional Health Services, often working for more than one municipality. They offer programmes to all primary and secondary schools in the region and the take-up by the schools is almost 100%. Since the first school-based YHC activities were initiated in The Netherlands – more than a century ago – the YHC has grown into a nation-wide, labour-intensive service, employing hundreds of physicians, nurses and medical assistants. By the time they leave school, every child in The Netherlands will have been exposed to a wide variety of preventive health and health promotion activities, administered by many different YHC workers. The services are most often rendered on the school premises and may include health promotion programmes, screening for specific physical abnormalities, well-care visits and (freely accessible) consultation hours. For the most part these activities are carried out by youth health care physicians, less often by nurses, and medical assistants. Between youth health care departments, there is a large variety in the total number, content and intensity of programmes, screening, and well-care visits as well as the availability of consultation hours at schools. This variety is largely due to

different views and priorities in the various health care regions with regard to the content of preventive services for children and adolescents.

Well-care visits are orientated towards primary or secondary prevention of physical, behavioural and psychological problems and are offered to all children and adolescents at a certain age or in specific grades. Especially at primary schools, parents are encouraged to accompany their children. At primary schools, the take-up by pupils is generally more than 90%, at schools for secondary education somewhat lower, depending on the level of education. The visits last 15 – 20 minutes a student.

During the visits, among others height and weight are measured and the height/weight ratio determined in relation to age and gender.[33] Dependent on age, questions are asked about unhealthy behaviour: smoking, use of alcohol and cannabis, and eating habits. Especially in the case of an abnormal height/weight ratio – almost always obesity – eating habits are discussed with student and/or parent.

The personal contact during well-care visits provides the possibility of giving individualised advice to parents, children and/or adolescents. Because of this personal approach, advice given during visits is supposed to be more effective than the often-unsolicited advice given in, for instance, education programmes or health promotion campaigns.

Consultation hours are accessible to pupils, parents and teachers, normally without prior appointment. In many cases, open consultation hours were implemented, because in the early eighties regular well-care visits for the older adolescents (age 16/17 years) were discontinued, often on budgetary grounds. They are intended to give easy access to the Health Care professionals – in most cases physicians, sometimes nurses – for questions on physical and mental health problems and their prevention. Because in freely accessible consultation hours, advice is often actively sought, the impact of individual counselling during these contacts is supposed to be greater than in the more non-specific setting of well-care visits. Special training is not obligatory for workers who conduct these consultation hours; additional schooling on top of the basic medical and public health training mainly depends on personal interests.

What sets youth health care practice apart from primary and secondary health care, is the fact, that YHC workers, be it physicians or nurses, are not permitted to treat children under their

care. If therapy of any sort is deemed necessary, the child must be referred to a general practitioner or other relevant therapist. This practice seems to be unique when compared to school health services in most other countries.

In the past years, not only the frequency of contacts has changed but also the content. Especially the last two decades have seen profound changes in the way school-based youth health care services are conducted, in many instances necessitated by budgetary cutbacks. Furthermore, a shift in attention from physical to mental health problems required a fundamental change in the content of prevention activities, and in the professional attitude of YHC workers.

Examples, however, of changes brought about on scientific grounds or due to outcomes of evaluative health services research, are rare. This is especially true for the total number of well-care visits, the content of these visits, the institution of freely accessible consultation hours at schools for primary or secondary education, health promotion activities and the like.

YHC still relies heavily on personal contact, physical examination and individualised advice for the prevention of physical, behavioural and psychological problems in children and adolescents. However, the effectiveness of this approach is not substantiated by any evaluative research.

Part of the rationale for implementing school-based activities is, that by frequent individual contacts, be it during screening, well-care visits or consultation hours, (the onset of) unhealthy behaviour, such as smoking and (excessive) alcohol use will be detected earlier so that advice can be given at a time when children are still amenable to health promotion messages and behaviour can be influenced. Therefore, preventive measures can be taken at a stage early enough to be effective. Since most problems leading to the development of health compromising lifestyles start early and tend to persist well into adulthood, more individual contacts should increase the likelihood of early detection and thus early prevention. But again, no studies are available to support this assertion.

In other countries, such as USA, UK and Australia, similar questions are raised regarding the effectiveness of school health services, the value of (repeated) well-care visits, and in general

the contribution of these activities to general health and healthy behaviour of children and adolescents. Also, the lack of scientific underpinnings for these activities and the urgent need for evaluative studies are emphasised and alternatives are discussed.[32,34-37]

The purpose of this study is to determine whether a greater number of well-care visits, and/or the availability of freely accessible ('open') consultation hours at schools for secondary education result in an improved lifestyle of the secondary school population and a reduced prevalence of obesity in male conscripts.

Population and methods

The High-School Students Study

In 1992 The Netherlands Institute for Budget Information repeated the High-School Students Study. More than 11,000 students were asked to complete a questionnaire, which included questions concerning lifestyle: smoking habits, use of alcohol and cannabis (ever use of tobacco, alcohol or cannabis in the last 12 months) and eating habits. The questionnaires were completed in the classroom in 1992, at the beginning of the new school year, and had a response of more than 95%. A random selection of 50% was made available for this analysis. Based on postal code of the school, it was determined to what youth health care department the students had to be allocated.

Based on the literature, the following co-variables were selected from the questionnaire for inclusion in the regression models as independent variables: ethnic origin, type of education, family situation, parental occupational status and degree of urbanisation of the place of residence of the subject.

The total number of well-care visits by youth health care physicians and/or nurses, the grades or years in which they were planned – at both primary and secondary education schools – and the availability of open consultation hours at schools for secondary education in the period of 1987-1992 were determined on the basis of annual reports of all the Dutch youth health care departments, and personal inquiries where necessary. Only one youth health care department

refused to participate. For each student in a certain grade at the time of the survey, the number of well-care visits he or she had been exposed to, the number of years since the last visit, and the availability of open consultation hours was assessed. Table 5.1 gives an overview of the distribution of the study population according to number of well-care visits, and availability of open consultation hours.

Table 5.1. Total number of students per number of well-care visits and availability of open consultation hours (High-School Students Study).

	consultation hours	no consultation hours	undetermined	TOTAL
no visits	235	45	-	280
1 visit	696	990	170	1,856
2 visits	1,124	765	415	2,304
3 visits	31	98	-	129
TOTAL	2,086	1,898	585	4,569

For each question on health behaviour (use of tobacco, alcohol, cannabis and eating habits) a dichotomous variable was constructed. With the resulting four dichotomous variables as dependents, in logistic regression procedures the effect of having access to open consultation hours (procedure 1) and of the total number of well-care visits and the time elapsed since the last of these visits (procedure 2) conditional on the co-variates (age, gender, ethnicity, grade, type of education, family situation, parental occupational status, degree of urbanisation) was estimated. The following interaction terms were also included: parental occupational status and ethnicity, type of school and ethnicity, and type of school and grade. Variables were added and retained in the model only when inclusion resulted in a substantial change (> 5%) in the Odds Ratio of the determinant under consideration. When an interaction term was included, in the final model the constituent variables were also included.

Ministry of Defence conscript data

From the Ministry of Defence height, weight, postal code of place of residence and year of birth were obtained of all (male) conscripts that underwent a physical examination in 1995. Only those that were born in the year 1976 or 1977 (age 19 or 18) were selected (n=12,251). Based

on the postal code it was determined to what youth health care department the conscripts had to be allocated.

As a measure of obesity, the Body Mass Index was used (BMI: weight(kg)/height(m)^2).[24,38] Cases were 1,004 conscripts with a BMI of more than 27.

As the variables described in a report of the Dutch Institute for Research on Government Spending on regional differences in prevalence of psychosocial problems among 0-18-year-olds,[39] are strongly associated with the prevalence of obesity as well, these six co-variables (ethnic origin, number and type of facilities for secondary education, family situation, parental occupational status and degree of urbanisation of the place of residence of the subject) were chosen to balance the youth health care departments with respect to possible differences in the prevalence of obesity. This was done by weighting the data with overall-weights for each region, composed of the weights for each variable for each region.

Based on the age of the conscript and the relevant information about the youth health care departments, the total number of well-care visits and the availability of open consultation hours were determined for each conscript. As all conscripts that had no well-care visits came from the same youth health care department, this group was not included in the analysis.

Table 5.2 gives an overview of the distribution of the number of conscripts per number of visits and the availability of open consultation hours before and after adjusting for differences in the six variables mentioned before.

From the Netherlands Bureau of Statistics information concerning the relevant census was obtained. The totals were then weighted for the six variables.

Table 5.2. Total unweighted and weighted* number of conscripts per number of well-care visits and availability of open consultation hours (Ministry of Defence conscript data).

	consultation hours		no cons. hours		undetermined		TOTAL	
	unweighted	weighted	unweighted	weighted	unweighted	weighted	unweighted	weighted
no visits	0	0	112	53	0	0	112	53
1 visit	967	561	761	599	0	0	1,728	1,160
2 visits	5,061	4,983	3,423	3,479	358	305	8,842	8,767
3 visits	245	229	254	243	0	0	499	472
unknown	226	463	0	0	844	1,320	1,070	1,783
TOTAL	6,499	6,236	4,550	4,375	1,202	1,625	12,251	12,236

* weighted for differences in degree of urbanisation, proportion of ethnic minorities, percentage of single-parent families, number and type of facilities for secondary education and percentage of people on social security

Results

For the High-School Students data, in two separate logistic regression procedures for each type of behaviour, the effect of having access to open consultation hours and of the total number of well-care visits plus the number of years since the last of these visits on the prevalence of this behaviour was estimated. Table 5.3 shows the Odds Ratios with their 95% confidence intervals for the four lifestyle variables under consideration. In all cases an Odds Ratio greater than 1.00 signifies an adverse effect.

Table 5.3. High-School Students Study: Odds Ratios (95% confidence intervals) for the four lifestyle variables in case of having access to open consultation hours, more frequent, and more recent well-care visits, before and after introduction of confounding variables (OR > 1.00 signifies an adverse effect).

		alcohol	tobacco	cannabis	eating habits
open consultation hours	crude OR	1.22 (1.06-1.41)	0.94 (0.82-1.07)	0.83 (0.60-1.16)	0.86 (0.76-0.97)
	adj. OR			0.96 (0.67-1.36)[b]	
	adj. OR	1.29 (1.11-1.50)[a]		1.20 (0.83-1.74)[c]	0.91 (0.80-1.04)[a]
number of well-care visits	crude OR	1.14 (0.89-1.33)	1.20 (1.04-1.38)	1.34 (0.94-1.91)	1.08 (0.95-1.24)
	adj. OR	0.99 (0.84-1.17)[d]	1.15 (1.01-1.33)[e]	1.30 (0.91-1.85)[e]	
number of years elapsed	crude OR	1.19 (1.11-1.29)	1.08 (1.01-1.16)	1.27 (1.07-1.51)	1.01 (0.94-1.08)
	adj. OR	0.91 (0.83-1.00)[d]	0.98 (0.91-1.06)[e]	1.11 (0.92-1.33)[e]	

[a] after introduction of variable 'type of education'   [d] after introduction of variable 'grade'
[b] after introduction of variable 'urbanisation'   [e] after introduction of variable 'age'
[c] after introduction of variable 'age', and 'type of education'

Except for the use of alcohol the effect of a greater number of well-care visits was in all cases opposite to the intended direction, and for the use of tobacco even significantly so (Odds

Ratio=1.15, 95% CI=1.01-1.33). The influence of the number of years elapsed since the last visit was varied and in all cases not significant.

The availability of open consultation hours had a significantly adverse effect on use of alcohol (Odds Ratio=1.29, 95% CI=1.11-1.50). Eating habits on the other hand were favourably affected, although not significantly so (Odds Ratio=0.91, 95% CI=0.80-1.04).

Table 5.4. Ministry of Defence conscript data: adjusted* Odds Ratios (95% confidence intervals) for obesity (BMI > 27) per number of visits and availability of open consultation hours (OR > 1.00 signifies an adverse effect).

	cases (BMI > 27)	referents (census)	OR (95% CI)
1 visit	95	8,664	
2 visits	733	66,672	1.00 (0.80-1.23)
3 visits	52	1,927	2.46 (1.74-3.46)
no consultation hours	373	47,441	
consultation hours	528	34,044	1.97 (1.72-2.25)

* weighted for differences in degree of urbanisation, proportion of ethnic minorities, percentage of single-parent families, number and type of facilities for secondary education and percentage of people on social security

For the conscript data, the Odds Ratios for obesity in case of having access to open consultation hours and more frequent well-care visits were calculated. Table 5.4 shows the adjusted Odds Ratios for obesity for male conscripts per number of visit and availability of open consultation hours. Both a greater number of visits (3 visits as compared to one) and the availability of open consultation hours had a significantly adverse effect on the prevalence of obesity.

Discussion

This study does not support the hypothesis that preventive activities of youth health care departments such as (more) frequent well-care visits or institution of open consultation hours at secondary schools, have a beneficial effect on health compromising behaviour. Before accepting these findings however, several methodological issues need to be addressed. With respect to misclassification, given the comprehensive method of data gathering, the information concerning the working methods of the youth health care departments is of high

quality. This is not the case where the content of well-care visits is concerned, especially in regard to health promotion activities and relevant advice. Studies suggest however, that inter-physician variations are far greater than possible differences between the departments.[40]

Internal migration has probably led to some misclassification on the determinants, as it was not possible to ascertain which students or conscripts had moved to other youth health care regions and therefore could have been to other youth health care working methods. Therefore, some dilution of the effect due to this misclassification might have occurred.

Generally, attendance at well-care visits is more than 85% and often reaches 95% at schools for higher general secondary or pre-university education. Failing to appear due to illness will generally lead to a call up later that year or the following year, so the total number of visits will eventually be the same. Nevertheless, students from a lower social-economic background and of those more often the girls, fail to appear relatively more often. The same can be said when non-attendance is caused by truancy, although in that case it more often concerns boys.

Until 1996, all Dutch men becoming of military age (18 years old) were routinely drafted. The cohort of 1995 conscripts therefore represents the birth-cohort of men that were eighteen in 1995 or shortly before. Of those a small proportion is actually enlisted and thus has a physical examination. Reasons for exclusion or deferment are physical and mental handicaps, continuation of education, and the like. As such the conscript data are selective and not a representative sample of Dutch men at that age. Because there are no regional differences in reasons for exclusion or deferment, however, the selection criteria are the same throughout the country and the data will be comparable between the youth health care departments. To further minimise the effect of a possible uneven distribution of relevant variables between the different categories, the data were weighted for differences in degree of urbanisation, proportion of ethnic minorities, percentage of single-parent families, number and type of facilities for secondary education and percentage of people on social security.

The lack of information about youth health care practice in the years between 1992 and 1995 will have little influence on the outcome of the analysis, if at all. Only one youth health care department (with 9 cases) had a well-care visit planned after grade 2 of secondary school, so all other conscripts would have had the total possible number of well-care visits in 1992. As for

consultation hours, in the period under consideration no youth health care departments discontinued these once they were instituted. Moreover, the institution of consultation hours will not be effective immediately after implementation and generally will take more than a year to become an accepted extension of youth health care practice. Therefore, influence of the institution of consultation hours in 1993 or later can be expected only after 1994.

It is not easy to find an explanation for the unexpected adverse effects, although an absence of positive effects is in line with literature regarding effectiveness of preventive programmes. At the very least it can be concluded that the claim by youth health care workers of a beneficial effect of repeated well-care visits and open consultation hours is not substantiated by these data. It can be hypothesised that in the case of the well-care visits, with their attention to unhealthy habits and accompanying health promotion messages, adolescents in a juvenile reaction against this well-meant advice and attention might exhibit precisely the behaviour they are warned against. Conversely, this could explain, why open consultation hours have a beneficial effect on eating habits. In the case of worry about overweight, adolescents actively seeking advice will be more prone to take it, translating into improved eating habits.

Conclusion

It is concluded that at the population level, a contribution of the Dutch youth health care departments to improving healthy behaviour and prevention of obesity among adolescents by offering one or more visits to youth health care workers or maintaining open consultation hours, cannot be demonstrated. This is surprising as the expectation with respect to the effectiveness of these programmes is high, and prevention of unhealthy behaviour is considered to be one of the main targets for youth health care activities in this age group. In view of the international literature, however, these high expectations seem less realistic.

Further studies are urgently needed to inquire into the reasons behind this lack of demonstrable effects. Also, it should be determined whether perhaps specific groups within the population can benefit from these youth health care activities, rather than the population as a whole. In the mean time, other methods for prevention of unhealthy behaviour and substance

abuse, within or outside the context of youth health care, should be developed. Leaving the activities unchanged would represent an unreasonable and disproportionate burden to the already limited resources of Preventive Health Care. In addition, this study stresses the importance of proper evaluation of any programme directed to prevent health compromising behaviour and substance abuse.

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EVALUATING THE EFFECTIVENESS OF YOUTH HEALTH CARE;

AN ECOLOGIC CASE-REFERENT STUDY DESIGN.

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Abstract

In a setting of long-standing, community-wide and generally accepted prevention activities such as those offered by youth health care services in The Netherlands, evaluative research in the form of experimental studies is hardly possible. Furthermore, as most interventions will bear fruit only after several years and the effects are often described in rather vague terms, even non-experimental study designs are fraught with possible difficulties. Although a study design using aggregate data is generally considered inferior or 'incomplete', and only useful in, for instance, generating etiologic hypotheses, in many cases, especially in health services research, this approach can be the only one feasible to evaluate the effectiveness of preventive programmes and interventions.

In this article the ecologic case-referent design is presented as a potentially feasible and valid method for estimating the ecologic effect of a population wide intervention on the outcome rate in those populations. In this case-referent design, most variables are measured at the individual level, except for the main exposure variable, which is measured at an aggregate or ecologic level.

Using a recently published study as an example, the advantages and drawbacks of the design are discussed in relation to other possible study designs.

Introduction

In the past 50 years, youth health care services in The Netherlands have developed from modest local initiatives to nation-wide, labour-intensive services, employing hundreds of physicians, nurses and medical assistants. By the time they leave school, every child in The Netherlands will have been exposed to a variety of preventive health and health promotion activities, administered by many different youth health care workers. Most of these contacts will have been in the form of well-care visits or screening activities for specific physical abnormalities.

Since the early days, the way youth health care services are conducted has changed profoundly, often necessitated by budgetary cutbacks. Furthermore, a shift in attention from physical to mental health problems required a fundamental change in the content of prevention activities and in the general attitude of youth health care workers. Examples, however, of changes brought about on scientific grounds or due to outcomes of evaluative health services research, are rare.

In this setting of long-standing, community-wide and generally accepted prevention activities, evaluative research in the form of experimental studies is hardly possible. Furthermore, as most interventions will bear fruit only after several years and the effects are often described in rather vague terms such as improved mental or physical well-being, even non-experimental study designs are fraught with possible difficulties. Nevertheless, in the face of an increasing demand for evidence-based medicine,[1,2] an effort has to be made to substantiate the effectiveness claimed by youth health care workers.

The main question to be addressed here is, whether at the aggregate level, specific youth health care interventions can lead to measurable effects on the health outcomes targeted, and whether these effects are substantial enough to justify their continuation. The core hypothesis to be evaluated is that, in order to be worthwhile, preventive interventions should lead to visible health outcome effects at the aggregate level, for which the decision to intervene was taken.

Thus, we searched for a study design, which can give a reliable

(1) post-hoc evaluation

(2) of the effectiveness

(3) of long-standing, community-wide prevention activities, that

(4) show effect only after a prolonged period,

(5) by comparing individual outcomes,

(6) with a relatively low incidence,

(7) between populations in regions with different youth health care programmes.

Design requirements

Although in this situation a 'Randomised Controlled Trial' (RCT), or any other form of experimentation, is not feasible, the study design as such is still rated as paradigmatic in studying the efficacy of interventions. For studying the effectiveness of interventions however, several publications have pointed out the drawbacks of this design.[3-11]

Nevertheless, the general principles underlying a well-conducted RCT should also apply to alternate study designs. Three criteria form the backbone of evaluative research: (a) relevance, (b) validity, and (c) power and efficiency.[12]

(a) *Relevance*. The study has to be relevant regarding intervention, projected outcome, and population targeted. Actual and specific youth health care interventions, therefore, should be studied with a view to the intended effects on the (quality of the) health of children.

(b) *Validity*. The study should provide an unbiased estimate of the effectiveness of specific youth health care interventions. This means that populations with different types of intervention have to be similar in baseline risk and distribution of potential confounders. In other words, the counterfactual rate in the population exposed should be the same as that in the referent population. Furthermore, information on determinant status should have no bearing on outcome measurement and vice versa.

(c) *Power and efficiency*. The number of children should be large enough to detect relevant differences across the determinant categories. The efficiency of the design can be enhanced by sampling from populations that are more or less at the ends of the continuum

of the health outcome under study (for instance 'severe depression' versus 'no symptoms of depression at all'). Also, the use of the available data from (national) registries should be considered.

Design options

From the catalogue of major epidemiological non-experimental study designs, only cohort and case-referent studies rely on a longitudinal relation between intervention and subsequent (later) health outcome. Population surveys estimating intervention experiences in the past do have this longitudinal element, provided that no selective survival took place. For determining the effect of public health interventions, however, such a design is less efficient than cohort- or case-referent studies, with their sampling schemes aimed at enhancing the contrast on the determinant scale or improving outcome distribution, respectively.

With respect to cohort studies, historical types are preferable over prospective studies with respect to efficiency, but require appropriate documentation of interventions and provide in general fewer possibilities for confounder control.[4,9,10,13] Moreover, in the situation that historical cohort-studies are possible, case-referent studies can also be conducted and generally are even more efficient.

All of these epidemiological designs, however, require data collection at the individual level. As this is often not possible, study designs with groups as unit of observation and/or analysis should be considered as an alternative.

When there is geographical variation in specific intervention strategies, and outcome data are available at the level of these geographical units, an ecological study can be performed, linking variation in intervention to variation in outcome parameter. As these ecological studies are typically done using routine statistics, a high level of efficiency and generalisability can be obtained.[14-17] Confounder control is often a problem, because they are often restricted to the few factors (e.g. age, gender) included in the registries. Of major concern is the failure of ecological level association to reflect individual level association, the ecological fallacy (or ecological bias). Identifying this type of bias is especially difficult in that it can occur both with and without confounding within and between groups.[4,18-21] However, if the aim is to estimate the

effect of the preventive action on the population level in a case-referent study design, ecological bias is not an issue. Other concerns regarding ecological designs relate to misclassification and in the context of evaluation of preventive interventions, the possibility of confounding by indication.[3,15,22-24]

Due to these drawbacks, and despite attempts to improve the design and analysis,[13,14,23-27] the ecological design is generally considered inferior.[4,10,18]

The ecologic case-referent design

In the ecologic case-referent study design, the distribution of the determinant (that is, experience with the intervention) among cases in a (national) case register is inferred from the intervention distribution at an appropriate aggregate level (e.g. regions with homogeneous specific prevention facilities). This distribution among cases is compared to that in a suitable reference population (e.g. the intervention distribution in the total collection of all regions). Where possible, confounding information, obtained at the individual level, should be used to adjust the crude estimate of the effect (the OR) by appropriate logistic modelling.

The design will, under the assumption that the regional decision to choose a specific preventive health policy is unrelated to the baseline risk for the specific outcome, enable the evaluation of the hypothesis that these preventive intervention strategies can lead to marked effects on the aggregate level.

In short, a hybrid design is suggested, in which individual and aggregate level measurements are combined. An example of the use of this design is a recently published study of the effectiveness of school screening for scoliosis by youth health care (YHC) workers in reducing population rates for surgery for adolescent idiopathic scoliosis.[28]

The purpose of the study was to estimate the group-level effect of participation in screening on population rates for scoliosis surgery under the assumption that screening is optimal when performed at an age of 12 or 13 years. To this end, for each subject the aggregate level of participation in the intervention in the years 1987-1992 for all members of the target population (all 12 or 13 year olds) in every YHC area in The Netherlands was determined. As the YHC offers programmes to all primary and secondary schools in their region and the take-up by the

schools and their pupils is more than 95%, the average level of participation of all 12 or 13 year olds in The Netherlands could accurately be determined. Information about the health outcome at the individual level (surgery for scoliosis in 12 – 19 year olds in the years 1990-1993 in The Netherlands), together with data on place of residence, age and gender (being the only possible confounder in this case), was obtained from a national registry with information on scoliosis surgery in every hospital in The Netherlands. Accessibility of hospitals, especially in the case of major surgery, is the same throughout The Netherlands as are the indications for conservative or surgical treatment of idiopathic scoliosis. In this manner several sources of bias could be minimised or even ruled out. The main source of possible bias in this study was nondifferential misclassification because of migration of subjects or difference between place of residence and location of the school. However, sensitivity analysis showed this to have no effect on the results of the study.

As the distribution of cases compared to that of the target population in the screening and non screening YHC regions proved to be exactly the same, the study did not support the view that screening for idiopathic scoliosis reduces the population rates for scoliosis surgery.

Strengths and weaknesses of the ecologic case-referent design

Relevance

Relevance with regard to intervention and outcome can be attained by a studied choice of the pertinent variables. In the example study, for instance, the population rate of surgery for scoliosis is a good indication of the effectiveness of the screening. Furthermore, by choosing a population based case-referent approach, the population under study is the population at risk. In the example study the referent population is almost identical to the theoretical study base. This is perhaps one of the stronger features of this design.

Validity

The greatest threat to the validity of ecologic designs is the ecological fallacy. However, in the ecologic case-referent design the objective is to estimate the group-level effect of participation

in an intervention programme on the population rate using a case-referent design. Therefore, this design is not subject to ecologic bias. If the objective would be to estimate the biobehavioural (individual-level) effect on the outcome risk in participants of the intervention, ecologic bias in the form of cross-level bias would be possible.

In an ecologic case-referent design, case ascertainment is independent of level of exposure or group. Lack of information bias is one of the distinct advantages of this design.

Case ascertainment should be as complete as possible. The outcome measure must be chosen with care, clearly delineated, and possibly dichotomous in nature, as this will preclude incomplete case ascertainment. To enhance the contrast and thereby the possibility of demonstrating possible effectiveness of the intervention under study, if possible, the extreme ranges of an outcome measurement should be compared, for instance the lowest and highest quartile of a scale.

When case ascertainment is complete and the whole of the relevant population serves as referents – as was the case in the example study – selection bias is unlikely.

Potential selection by indication is of more concern in non-experimental research. Therefore, it must be assured that there is no relation between the introduction of the intervention and the occurrence of the outcome. As many community-wide interventions are introduced nationally because of a perceived problem in a population as a whole, however, any such relation on a regional scale, be it direct or indirect, is unlikely. Because screening for scoliosis, for instance, has been introduced and is continued irrespective of population rates for scoliosis surgery, which are the same throughout The Netherlands, in the example study selection by indication is unlikely.

Because of the way cases and referents were chosen, other types of differential misclassification, both for exposure and confounders, are unlikely.

Nondifferential misclassification, for instance because of migration, is one of the possibly more substantial sources of bias in the study. The extent to which migration bias can occur, depends upon the time lag between intervention and subsequent outcome – in the example study ranging from 1 to 6 years.

By measuring the exposure as accurately as possible, nondifferential misclassification can be further reduced. This means, one has to be certain where, when and/or by whom the intervention is implemented. It is not necessary for the intervention to be implemented in a *completely identical* manner in every region and/or – in this case – by every youth health care worker, as long as the method used, the age at which the activity takes place, or any other variable that is of importance, is the same. After all, the purpose of the study is not to determine whether an individual youth can profit from the intervention, but whether the relevant population as a whole could have benefited.

Power and efficiency

By using case-referent methodology, the efficiency of the design is high, whereas the number of cases and referents under study and therefore the power of the design could be increased substantially by using the ecological approach. Therefore, the balance between power and costs in the ecologic case-referent design is fairly optimal.

The design could be further strengthened by collecting supplemental data on individual-level exposure from individuals randomly sampled from each group.[10] In that way, using multilevel analysis, both the biobehavioural effect of programme participation and the ecologic effect of the population intervention could be assessed in the same study and subsequently compared for consistency.

Discussion and conclusion

Although community intervention trials would have far greater convincing power in demonstrating the efficacy of preventive measures and interventions, in post-hoc evaluation of preventive health services, including youth health care, such designs are inappropriate, unfeasible, and even inadequate. Designs that only use group level measurements, although in theory sufficient to verify the effectiveness of community-wide interventions, will always be considered questionable, because proof that the bias introduced is small enough for the result

of the study to be acceptable, will be difficult to render. Therefore, a hybrid design, in which individual-level measurements are combined with group-level measurements, can possibly be more persuasive, in particular because the bias from several sources will be substantially reduced. It is clear, however, that further research into the properties of the ecologic case-referent design is necessary to assess its potential worth.

This shift in attention from the individual level (back) to the population level or the integration of the two in a more encompassing 'eco-epidemiology' has recently been advocated by others.[29,30] The use of the ecologic case-referent study design could facilitate this development and provide answers to the questions raised by politicians and public health services alike, concerning the effectiveness of the myriad of preventive measures that found their way into our society. This means, that the design is also appropriate for many other areas in- and outside public health, as diverse as occupational health, law enforcement measures, health promotion, environmental regulations, et cetera.

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LONG-TERM EFFECTS OF PREVENTIVE ACTIVITIES OF YOUTH HEALTH CARE IN THE NETHERLANDS.

Results of a four-part study.

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Abstract

In the past decades, youth health care for schoolchildren in The Netherlands underwent significant changes. This included not only the frequency and content of well-care visits and screening activities, but also the institution of freely accessible ('open') consultation hours at schools for primary and secondary education. Furthermore, a shift in attention from physical to mental health problems required a fundamental change in the content of prevention activities and in the professional attitude of youth health care workers.

However, these changes are seldom based on scientific evidence. In this article the results are presented of four studies of the effectiveness at a population level of well-care visits, freely accessible ('open') consultation hours at schools for secondary education and screening for scoliosis, using a new ecologic case-referent study design. In an effort to achieve optimum generalisability, many different databases and registries were used and the working methods of virtually all youth health care departments in The Netherlands with respect to these activities were ascertained.

In none of these studies, an unequivocal positive effect of the preventive activities, mentioned above, could be demonstrated at a population level – be it prevention of suicide, mental health problems, or health compromising behaviour, or the prevention of surgery for adolescent idiopathic scoliosis by school screening. It is concluded therefore, that additional studies are urgently needed to determine whether these activities can at least be justified when directed at specific populations at risk. Especially, the unexpected adverse effects of open consultation hours on various health outcomes demand further clarification.

In the mean time, other methods for prevention of unhealthy behaviour and mental health problems, within or outside the context of youth health care, should be developed. Leaving the activities unchanged would represent an unreasonable and disproportionate burden to the already limited resources of Preventive Health Care. In addition, these studies stress the importance of proper evaluation of any programme directed to the prevention of mental health problems and unhealthy behaviour.

Introduction

Youth health care (YHC) departments in The Netherlands are part of the Regional Health Services, often working for more than one municipality. They offer programmes to all primary and secondary schools in the region and the take-up by the schools is almost 100%. Since the first school-based YHC activities were initiated in The Netherlands – more than a century ago – the YHC has grown into a nation-wide, labour-intensive service, employing hundreds of physicians, nurses and medical assistants. By the time they leave school, every child in The Netherlands will have been exposed to a wide variety of preventive health – and health promotion activities, administered by many different YHC workers. The services are most often rendered on the school premises and may include health promotion programmes, screening for specific physical abnormalities, well-care visits and (freely accessible) consultation hours. For the most part these activities are carried out by youth health care physicians, less often by nurses, and medical assistants. Between youth health care departments, there is a large variety in the total number, content and intensity of programmes, screening, and well-care visits as well as the availability of consultation hours at schools. This variety is largely due to different views and priorities in the various health care regions with regard to the content of preventive services for children and adolescents.

Well-care visits are orientated towards primary or secondary prevention of physical, behavioural and psychological problems and are offered to all children and adolescents at a certain age or in specific grades. Especially at primary schools, parents are encouraged to accompany their children. At primary schools, the take-up by pupils is generally more than 90%, at schools for secondary education somewhat lower, depending on the level of education. The visits last 15 – 20 minutes a student.

The personal contact during well-care visits provides the possibility of giving individualised advice to parents, children and/or adolescents. Because of this personal approach, advice given during visits is supposed to be more effective than the often-unsolicited advice given in, for instance, education programmes or health promotion campaigns.

Consultation hours are accessible to pupils, parents and teachers, normally without prior appointment. In many cases, open consultation hours were implemented, because in the early

eighties, regular well-care visits for the older adolescents (age 16/17 years) were discontinued, often on budgetary grounds. Consultation hours are intended to give easy access to the Health Care professionals – in most cases physicians, sometimes nurses – for questions on physical and mental health problems and their prevention. Because in freely accessible consultation hours, advice is often actively sought, the impact of individual counselling during these contacts is supposed to be greater than in the more non-specific setting of well-care visits. Special training is not obligatory for workers who conduct these consultation hours; additional schooling on top of the basic medical and public health training mainly depends on personal interests.

What sets youth health care practice apart from primary and secondary health care, is the fact, that youth health care workers, be it physicians or nurses, are not permitted to treat children under their care. If therapy of any sort is deemed necessary, the child must be referred to a general practitioner or other relevant therapist. However, in some cases a restricted number of short counselling sessions may precede (or even replace) referral to, for instance, institutes for mental welfare. This practice seems to be unique when compared to school health services in most other countries.

In the past years, not only the frequency of contacts has changed but also the content. Especially the last two decades have seen profound changes in the way school-based youth health care services are conducted, in many instances necessitated by budgetary cutbacks. Furthermore, a shift in attention from physical to mental health problems required a fundamental change in the content of prevention activities and in the professional attitude of YHC workers.

Examples, however, of changes brought about on scientific grounds or due to outcomes of evaluative health services research, are rare. This is especially true for the total number of well-care visits, the content of these visits, the institution of freely accessible consultation hours at schools for primary or secondary education, health promotion activities and the like.

YHC still relies heavily on personal contact, physical examination and individualised advice for the prevention of physical, behavioural and psychological problems in children and

adolescents. However, the effectiveness of this approach is not substantiated by any evaluative research.

Part of the rationale for implementing school-based activities is, that by frequent individual contacts, be it during screening, well-care visits or consultation hours, (the onset of) problems will be detected earlier. Therefore, preventive measures can be taken at a stage early enough to be effective. Since most problems leading to the development of unhealthy lifestyles, adverse mental health and the like, start early and tend to persist well into adulthood,[1-7] more individual contacts should increase the likelihood of early detection and thus early prevention. But again, no studies are available to support this assertion.

In a setting of long-standing, community-wide and generally accepted prevention activities, evaluative research in the form of experimental studies is hardly possible. Furthermore, as most interventions will bear fruit only after several years and the effects are often described in rather vague terms, such as improved mental or physical well-being, even non-experimental study designs are fraught with possible difficulties. Nevertheless, in the face of an increasing demand for evidence-based medicine,[8,9] an effort was made to substantiate the effectiveness claimed by youth health care workers.

In each of the four studies presented here, the research question is, whether at the aggregate level, specific youth health care interventions can lead to measurable effects on the health outcomes targeted, and whether these effects are substantial enough to justify or even necessitate their continuation.

Population and methods

To address some of the questions regarding the effectiveness of youth health care preventive activities, the following methodological steps were taken:

I   The study was limited to the three principal activities of youth health care: repeated well-care visits, implementation of freely accessible ('open') consultation hours and screening for specific physical abnormalities.

II A total of four different health outcomes were chosen. Selection was based on (a) their importance as preventable disease and/or condition, because of the possible impact on later health, (b) their diversity, given the wide range of youth health care activities, and (c) the possibility of clear operationalisation of the outcome.

III Comprehensive information was obtained from all (but one) youth health care departments in The Netherlands, with respect to the activities mentioned under (I) over the years 1987-1992.

IV Data on the selected outcomes were obtained from many different registries, so as to minimise the chance of introducing any kind of bias because of the idiosyncrasies of a specific registry. Also, wherever feasible, the referent population comprised the complete relevant census of the Dutch population.

V Data were analysed, using an efficient new ecological case-referent design. In this design case-referent methodology is combined with an ecological approach. The distribution of the determinant among cases is inferred from the intervention distribution at an appropriate aggregate level. The distribution among cases is then compared to that in a suitable reference population. The various properties of the study design are discussed in a separate publication.[10]

VI In three of the studies the research question was, whether more well-care visits, and/or the availability of freely accessible ('open') consultation hours at schools for secondary education could result in an improved lifestyle and/or mental health, expressed in specific outcome measures. A fourth study examined the possible influence of school screening for adolescent idiopathic scoliosis on population rates of scoliosis surgery, another point of contention in youth health care.

As indicated, the outcome measure used in the study of the effectiveness of school scoliosis screening, was surgery for adolescent scoliosis.[11] In the three remaining studies, the following outcome measures were chosen.

To measure a possible impact on mental health, in an ecological case-referent study, population rates for parasuicide and suicide in adolescence were compared between regions

with and without open consultation hours. Using data from a study of high-school students,[12] the distribution of cases and referents in regard to self-reported parasuicide, scores on a mental health scale and present mood, was compared between students with different exposures to YHC activities (number of well-care visits and access to open consultation hours).[13,14]

To measure a possible influence on lifestyle – and thereby on (later) physical and mental health and general well-being – using data from the study of high-school students, prevalence of substance use (tobacco, alcohol, and cannabis) and eating habits were compared. In the same study, rates for obesity in male conscripts were compared between regions with different YHC working methods.[15]

Results

Scoliosis screening.

The study of the effect of school screening for scoliosis on population rates for adolescent scoliosis surgery, showed no difference in the distribution of surgery cases between regions with and without screening. (table 7.1)

Table 7.1. Adjusted Odds Ratios (95% confidence intervals) for surgery for adolescent idiopathic scoliosis in non-screening youth health care departments.

All cases (n=182)	1.00 (0.74-1.34)
Cases with surgery 1 year after possible screening (n=150)	1.03 (0.74-1.43)

Suicide and parasuicide.

Offering freely accessible consultation hours at schools for secondary education could not be shown to contribute to the reduction of suicide mortality, hospital admission rates for parasuicide (table 7.2), or incidence of parasuicide among high-school students (adjusted Odds Ratio=0.96, 95% CI=0.72-1.26). A remarkable finding is the increased risk for hospital admissions for parasuicide cases needing surgery, found in regions with open consultation hours (adjusted Odds Ratio=2.59, 95% CI=1.30-5.16).

Table 7.2. Adjusted Odds Ratios (95% confidence intervals) for (para)suicide in youth health care departments with freely accessible consultation hours.

completed suicide	0.98 (0.69-1.38)
hospital admission for parasuicide and surgery	2.59 (1.30-5.16)
hospital admission for parasuicide and psychiatric disorder	1.09 (0.78-1.53)
all hospital admissions for parasuicide	1.30 (0.97-1.75)

Mental health.

The (number of) well-care visits did not contribute to the prevention of mental health problems or improvement of 'present mood' in high-school students. (table 7.3) Furthermore, only students of schools for lower vocational education seemed to benefit from open consultation hours, at least as far as their mental health was concerned. This effect, however, was not statistically significant. The Odds Ratio of consultation hours, when comparing mental health of students of schools for lower vocational education to that of students of all other types of schools, was 0.81 (95% CI=0.63–1.04).

Table 7.3. Adjusted Odds Ratios (95% confidence intervals) for adverse mental health and state of mind in case of having access to open consultation hours, more frequent, and more recent well-care visits (OR > 1 signifies an adverse effect).

	adverse mental health	adverse state of mind
open consultation hours	0.90 (0.74-1.09)	1.15 (0.93-1.42)
number of well-care visits	1.02 (0.84-1.24)	0.92 (0.74-1.14)
number of years elapsed	0.96 (0.87-1.05)	1.00 (0.90-1.11)

Lifestyle.

Neither open consultation hours nor (number of) well-care visits had a positive effect on

Table 7.4. Odds Ratios (95% confidence intervals) for the four lifestyle variables in case of having access to open consultation hours, more frequent, and more recent well-care visits (OR > 1.00 signifies an adverse effect).

	alcohol	tobacco	cannabis	eating habits
open consultation hours	1.29 (1.11-1.50)	0.94 (0.82-1.07)	1.20 (0.83-1.74)	0.91 (0.80-1.04)
number of well-care visits	0.99 (0.84-1.17)	1.15 (1.01-1.33)	1.30 (0.91-1.85)	1.08 (0.95-1.24)
number of years elapsed	0.91 (0.83-1.00)	0.98 (0.91-1.06)	1.11 (0.92-1.33)	1.01 (0.94-1.08)

health compromising behaviour, such as unhealthy eating habits, use of alcohol, tobacco, and cannabis (table 7.4), or on prevalence of obesity in male adolescents conscripts. (table 7.5)

Table 7.5. Odds Ratios (95% confidence intervals) for obesity (BMI > 27) per number of well-care visits (referent category: 1 visit) and availability of open consultation hours (OR > 1.00 signifies an adverse effect).

2 well-care visits	1.00 (0.80-1.23)
3 well-care visits	2.46 (1.74-3.46)
consultation hours	1.97 (1.72-2.25)

Discussion

In all four studies, the question was not so much, whether in individual cases an intervention perhaps could have been of benefit, but whether the effectiveness of the intervention at a population level could be considered substantial enough to merit, or even necessitate continuation.

Integrity of the information concerning youth health care activities and nondifferential misclassification of cases are the main issues in determining the internal and external validity of the results of the four studies. The arguments concerning this validity, and generalisability are extensively discussed in the relevant sections of the respective articles. Therefore, in this article we would like to confine ourselves to a discussion of the possible explanations of these results and the implications for the future of the youth health care as it is practised by many Regional Health Services in The Netherlands.

Scoliosis screening

The results of the study of the effect of school scoliosis screening on population rates of surgery for idiopathic adolescent scoliosis seem unequivocal: if the object of the screening is prevention of surgery for adolescent scoliosis, continuation of this procedure should be reconsidered.

One frequently heard argument for continuing the screening programme nonetheless, is that it not only serves to prevent surgical intervention in case of progressive scoliosis, but also facilitates early detection of other structural or postural abnormalities of the spinal column. Even when this is considered to be a legitimate ground for screening – although, when applying the well-known rules of Wilson and Jungner,[16] this seems less apparent – it would be an inappropriate use of the screening programme. If the aim of screening is no longer prevention of scoliosis surgery, different screening methods and instruments, employment of

other YHC-workers than physicians, and/or the choice of a different age group should be considered. It could even be debated, whether in that case involvement of YHC-departments would be appropriate. Screening for postural or structural abnormalities of the spinal column could, for instance, well be placed into the capable hands of physical education teachers.

Well-care visits

At a population level no beneficial influence could be demonstrated of (any number of) well-care visits. In at risk populations, however, this might not be the case. As in many Western countries, in The Netherlands there are (urban) regions with characteristics reminiscent of the days when youth health care was first introduced. Here the traditional methods of YHC may prove their worth in promoting hygiene and healthy eating habits, prevention of infectious diseases, guidance and counselling in raising children, et cetera. These preventive activities, when administered in the individualised setting of well-care visits, may well be one of the few effective ways to reduce existing inequalities in health. Further studies are necessary to determine whether well-care visits, targeting only particular regions or groups of population at risk, can have the desired effect. For influencing mental or physical well-being, or health compromising behaviour in the general population, however, the use of this labour-intensive and (thus) costly instrument seems unjustified.

Open consultation hours

The availability of freely accessible consultation hours at schools for secondary education does not contribute to the reduction in rates of (para)suicide in adolescents.
Suicide attempts are frequently preceded by signs of (severe) depression or one of the other so-called warning signs.[17] Although these signs will perhaps not be recognised as precursors of (para)suicide as such, they will often be noted by teachers, student advisors, or even fellow-students. One of the professed effects of consultation hours held at secondary schools is that in that way referral of youths by teachers or student advisors can be facilitated. Taking the results of the study into consideration, at least in regard to referral of suspected psychosocial problems, this does not seem to be the case. By some youth health care workers it is even

contended that institution of consultation hours at secondary schools induces some sort of 'slackness' in these matters on the part of teachers and student advisors (see also the as yet unexplained finding of the adverse effect of consultation hours on hospital admission rates for parasuicide cases needing surgery; table 7.2). An explanation is sought in the fact that, since students seem to have easy access to these facilities, teachers will be less alert to signs of psychosocial distress, thinking their intervention will be unnecessary as the students in question will seek counselling on their own accord. This is supported by the fact that enhancement of the professional expertise of teachers and student advisors by the Regional Institutes for Ambulant Mental Welfare (RIAGG's) does have a statistically significant positive effect on the prevention of parasuicide (adjusted Odds Ratio=0.60; 95% CI=0.44-0.81).[13]

In this light it would be advisable to let the introduction of consultation hours be accompanied by efforts to enhance teachers' expertise in detecting (mental health) problems in their pupils, much like the programme offered by the RIAGG's.

The results of the study indicate, that open consultation hours can possibly have a beneficial influence on mental health, but only when certain conditions are satisfied: concurrent enhancement of professional expertise of teachers and student advisors, and by targeting specific groups, such as pupils of schools for lower vocational education. On the whole, these conditions are comparable to those to be met when considering to implement well-care visits: only in particular regions and/or targeting specific populations at risk. Possibly, the overall lack of demonstrable effects on mental health and state of mind is caused by the same factors that give rise to the lack of a positive influence of consultation hours on prevention of (para)suicide. Although open consultation hours seem to have a positive effect on eating habits, prevalence of later obesity is influenced negatively.

In general it can be concluded, that further studies are urgently needed to inquire into the reasons behind the lack of demonstrable effects of these YHC activities. In the mean time, other methods for preventive health care in children and adolescents, within or outside the context of youth health care, should be developed. Leaving the activities unchanged would represent an unreasonable and disproportionate burden to the already limited resources of

preventive health care. In addition, it cannot be emphasised enough, that rigorous evaluation of any preventive health programme before introduction should be an absolute requirement to merit consideration for general implementation.

Acknowledgements

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CHAPTER 8

EPILOGUE

Introduction

In 1992, after a period of intense discussions, the working methods of the youth health care (YHC) department in Groningen[a] were radically changed: well-care visits were abandoned completely, to be replaced with more collective preventive activities and screening for specific abnormalities. Having been a youth health care physician for more than 10 years and as an epidemiologist, the author of this thesis was in part instrumental in the developments in Groningen. Although several other YHC departments in The Netherlands in one way or another have since followed the Groningen example, this approach has been and still is highly controversial. The underlying motive for this thesis was a desire to provide scientific evidence as a basis for further discussion about optimal practice in youth health care.

It was not the intention of this study to 'prove' or 'disprove' the effectiveness of YHC activities. After so many years of YHC on a national scale, providing such proof by for instance randomised studies with long-term follow-up, is impossible. Random allocation of children or even YHC departments to different methods of YHC, and a follow-up with continuation of the experimental status for at least one or two decades is unfeasible. Nor was it the intention of this thesis to dispute the fact that an individual child could profit from any of the current YHC activities. Every professional, including the author, can tell at least one anecdote of a child having experienced substantial health benefits due to YHC. However, attempting to highlight the value of present-day YHC by enumerating the successes in individual cases clearly disregards the fact, that (1) in order to help an individual child, a very elaborate and costly health care system has to be maintained, (2) in many cases (even more) children will develop adverse health outcomes despite these efforts, and in some instances may even become a victim of the rigid confines of the system, and (3) there are perhaps other and more effective ways to reach the same end, ways that could also be beneficial for children now unnoticed or disregarded.

The objective of this study was to estimate the effect on a population level of particular YHC activities on health and well-being in later life. By choosing specific outcomes for which

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[a] then the Regional Health Service 'Groningen Stad en Ommeland'

properly defined proxies are available and monitored, by including information on all YHC departments[a] in The Netherlands for a certain period in time, by using several sources of registered information, and by introducing an efficient tailor-made design suitable for a valid estimation of the effects (the ecologic case-referent study design), new empirical evidence of the value of YHC activities is presented, which can be used for future YHC policy.

The study design

In this thesis, the ecologic study design is presented as the optimal design, considering the aim of the study and the characteristics of YHC activities in The Netherlands. That does not mean, however, that the constituent studies do not have their methodological problems. As, for instance, the studies are registry-based, several possibilities for misclassification should be considered.

First, the information concerning the working methods of the YHC departments could be insufficient or even incorrect. Given the comprehensive method of data gathering, this is not very likely.

Nondifferential misclassification, for instance because of migration, is another possible source of bias in some of these studies. The extent to which migration bias can occur, depends upon the time lag between intervention and subsequent outcome and therefore differs for each study.

By measuring the exposure as accurately as possible, nondifferential misclassification can be reduced. This means, one has to be certain where, when and/or by whom the intervention is implemented. It is not necessary for the intervention to be implemented in a *completely identical* manner in every region and/or – in this case – by every youth health care worker, as long as the method used, the age at which the activity takes place, or any other variable that is of importance, is the same. After all, the purpose of the study is not to determine whether an individual youth can profit from the intervention, but whether the relevant population as a whole could have benefited.

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[a] only one YHC department refused co-operation

In an ecologic case-referent design, case ascertainment is independent of level of exposure or group. Lack of information bias is one of the distinct advantages of this design. Furthermore, when case ascertainment is complete and (most of) the relevant population serves as referents, selection bias is unlikely.

The greatest threat to the validity of ecologic designs is the ecological fallacy. However, in the ecologic case-referent design the objective is to estimate the group-level effect of participation in an intervention program on the population rate using a case-referent design. Therefore, this design is not subject to ecologic bias. If the objective would be to estimate the biobehavioural (individual-level) effect on the outcome risk in participants of the intervention, ecologic bias in the form of cross-level bias would be possible.

By using case-referent methodology, the efficiency of the design was high, whereas the number of cases and referents under study and therefore the power of the design could be increased substantially by using the ecological approach.

The results

In all four studies the estimated Odds Ratios were close to 1.00, indicating no demonstrable effects of YHC activities on the specific health outcomes under study. As discussed above, this may in part be explained by (nondifferential) misclassification, but only to a limited degree. We conclude that the lack of demonstrable effects on the aggregate level is a reflection of the very low effectiveness of these YHC activities. Some results, in particular the findings indicating an adverse effect of open consultation hours on suicide prevention as discussed in chapter 6, even indicate that implementing or maintaining specific YHC activities – e.g. consultation hours without enhancement of the professional expertise of teachers and student advisors – can have unexpected negative effects.

It might be argued, that an absence of demonstrable effects is attributable to one or more extraneous influences impacting on youth health and health determining behaviour, thereby 'diluting' the influence of YHC to an extent that no effect can be measured. Assuming this is correct, the question regarding the rationale for providing these YHC activities, given the lack of measurable effects, still stands.

Another argument could be, that YHC activities should not be assessed separately, but as part of a whole.[1] This, however, precludes any attempts to evaluate the value of specific YHC activities, because no study will be able to show general overall effects of youth health care.

The overall conclusion of this thesis is, that the specific YHC activities discussed – (repeated) well-care visits at schools for primary and secondary education and open consultation hours at secondary schools – do not contribute substantially to distinct health outcomes, such as a reduction of the incidence of (para)suicides, adverse mental health, unhealthy behaviour, or prevalence of obesity. In some instances these activities even seem to be harmful.

Another specific YHC activity, school screening for scoliosis, also could not be shown to have the desired effect, that is, a reduction of surgical interventions.

Recommendations for youth health care and research

With respect to youth health care policy and research the following recommendations can be made:

♦ Screening for adolescent scoliosis should be reconsidered. The fact, that in adolescents this screening had no demonstrable effect on population rates for surgery, should be taken as a warning against an indiscriminate introduction of screening for (juvenile) idiopathic scoliosis as advocated by the Youth Health Care Task Force.[1] Such screening is only justifiable if properly designed community intervention trials provide evidence for its effectiveness.

If the screening is meant to facilitate early detection of other structural or postural abnormalities of the spinal column in adolescence as well, different screening methods (and/or employing other disciplines) should also be taken into consideration.

♦ In further studies it should be determined, whether open consultation hours at schools for secondary education should be accompanied by enhancement of the professional expertise of teachers and student advisors. Without such measures, these activities could have an adverse effect on mental health, as expressed in the incidence of (para)suicide.

♦ More research is necessary to evaluate the effect of open consultation hours on (mental) health and health determining behaviour in general. From the various studies in this thesis, no unequivocal recommendations can be made regarding their introduction or use because both positive and negative effects are found. Further studies are necessary to determine the underlying reasons for these heterogeneous effects.

♦ Although well-care visits at a population level do not seem to have an added value in improving health and health determining behaviour as measured in the various studies, it could well be that on a certain level or in a specific setting, these activities do have an impact on specific health outcomes. Studies are necessary to determine where and when the implementation of this instrument is justified.

♦ Introduction of any YHC activity should be preceded by rigorous testing and evaluation. Activities already in use should be (further) evaluated in order to decide whether continuation in their present form is justified. This evaluation should concentrate more on long-term effects and go beyond the evaluation of process and procedure.

♦ More time should be spent on developing, assaying and scientifically evaluating new innovative methods for use in youth health care. For this task, Regional Health Services should set aside adequate resources.

♦ Further research into the properties of the ecologic case-referent design is necessary to assess its potential value in evaluating the effectiveness of community-wide interventions.

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SUMMARY

The foundations of modern school health care in The Netherlands date back to the beginning of the last century, when for the first time legislation appeared regarding school building and design. Then, the main focus of interest was improvement of hygienic conditions, and in the following decades legislation was repeatedly adapted to changing insights into the impact of school environment on children's health. At first, physicians played hardly any role. However, increasing awareness of the role of nutrition and (personal) hygiene in preventing infectious diseases led to several laws and regulations in which physicians were given a more prominent part in school supervision. In 1904 this resulted in the appointment of the first 'real' school physician.

Because of increasing prosperity of the general population resulting in better health by improving nutrition and hygiene, the focus of attention of school medicine shifted from care for nutrition and hygiene to early detection of physical disease and abnormalities. In recent years attention has reverted to some aspects of collective medicine, particularly the promotion of positive health and well-being by health education and collective preventive activities. Nevertheless, youth health care is still very much oriented towards the individual child. Individual care, notably in the form of repeated well-care visits, is still considered to be the mainstay of youth health care and takes up most of its resources.

Between YHC departments, there is a large variety in the total number, content and intensity of programmes, screening, and well-care visits as well as the availability of consultation hours at schools. This variety is in part due to the fact that the 1990 Collective Preventive Health Care Act does not give specific directives regarding the contents of youth health care. Also, youth health care services themselves differ substantially in their views and priorities with regard to the content of preventive services for children and adolescents.

Only in recent years, the first steps were taken to provide the YHC activities with a scientific underpinning by conducting research into the (long-term) effects. This development is strongly influenced by external pressures brought to bear by state and community (health) officials who demand some kind of evidence for the professed efficiency and efficacy of YHC, as it is practised to date. However, most of the research concerns cost-effectiveness of specific

activities and is mainly directed at health care for pre-school children. In addition, several studies have been published on the technical aspects of screening tests and the efficiency of certain screening activities in detecting pre-clinical conditions.

The purpose of this thesis is to assess whether different approaches to the delivery of health care to young people by the various YHC departments of Regional Health Services are associated with differences in health and health-related behaviour.

It is hypothesised, that (repeated) well-care visits at schools for primary and secondary education and the institution of easily accessible ('open') consultation hours at schools for secondary education will result in better mental health and less health compromising behaviour. Here, better mental health is expressed as a lower incidence of (para)suicide and better scores on mental health questionnaires; improved health related behaviour, in this case, means a lower prevalence of use of tobacco, alcohol and cannabis, improved (self-reported) eating habits and a lower prevalence of obesity in male conscripts.

Further, it is hypothesised, that school screening for adolescent idiopathic scoliosis will result in less surgical interventions for this condition.

To minimise the chance of introducing a specific kind of systematic error, data on the selected outcomes were obtained from several national registries and national studies. Apart from that, from 62 of the then 63 youth health care departments, information was obtained with respect to frequency, content and implementation of scoliosis screening, well-care visits and open consultation hours in the period studied (1987 – 1992). Motivation and design of this thesis are further discussed in chapter 1.

In chapter 2 a study of the effect of school screening for scoliosis on population rates for adolescent scoliosis surgery is discussed. The data on the number of surgical interventions for adolescent idiopathic scoliosis (cases) were obtained from the national hospital discharge register (SIG Services).

The study shows no difference in the distribution of cases among youth health care regions with or without scoliosis screening (OR=1.0, 95% CI=0.7-1.3). Consequently, it is concluded

that screening does not have a measurable effect in reducing population rates of surgery for adolescent idiopathic scoliosis. Screening, therefore, should be reconsidered.

Chapter 3 describes a study of the influence of open consultation hours at schools for secondary education on suicide mortality, hospital admission rates for parasuicide, and incidence of parasuicide among high-school students. For this study, three databases were used: mortality statistics of the Netherlands Bureau of Statistics, the national hospital discharge register (SIG Services) and data from the High-School Students Study conducted by The Netherlands Institute for Budget Information.

The study showed no difference in distribution of (para)suicide cases between youth health care regions with or without open consultation hours (OR varying between 1.0, 95% CI=0.7-1.4 and 1.1, 95% CI=0.8-1.6; an OR > 1.0 denotes an adverse effect). A disturbing exception to this is the influence on hospitalisation because of severe trauma due to parasuicide. Here the incidence of cases is significantly higher in regions with open consultation hours (OR=2.6, 95% CI=1.3-5.2). Given that a much more equivocal and general variable – the regional school-oriented preventive activities of Mental Welfare organisations – does prove to have a significant positive effect on the prevention of parasuicide (OR=0.6, 95% CI=0.4-0.8) suggests, that in general the study has enough sensitivity to determine a possible influence of open consultation hours.

Chapter 4 describes a study assessing the influence of the (number of) well-care visits, time since the last visit and availability of open consultation hours on mental health problems and general well-being in high-school students. For this study, again the data from the High-School Students Study are used.

This study shows that open consultation hours and (repeated) well-care visits have no significant influence on the health outcomes mentioned (OR varying between 0.9, 95% CI=0.7-1.1 and 1.2, 95% CI=0.9-1.4, again with an OR > 1.0 denoting an adverse effect). Further analysis showed, however, that possibly students of schools for lower vocational education could benefit from open consultation hours (OR=0.8, 95% CI=0.6–1.0).

In chapter 5 a study is described of the influence of the (number of) well-care visits, time since the last visit and availability of open consultation hours on health determining behaviour, such

as (self-reported) eating habits, prevalence of the use of alcohol, tobacco, and cannabis, and the prevalence of obesity. For this study, data were used from the High-School Students Study as well as conscript data from the Ministry of Defence.

This study shows that open consultation hours and (repeated) well-care visits have no or even a negative influence on health determining behaviour and eating habits (OR varying between 0.9, 95% CI=0.8-1.0 and 1.3, 95% CI=1.1-1.5, with an OR larger than 1.0 denoting an adverse effect). The influence of these activities on the prevalence of obesity is in all cases unfavourable: with three well-care visits (as opposed to one) the OR for obesity (QI > 27) in male conscripts was 2.5 (95% CI=1.7-3.5) and in case of availability of open consultation hours the OR was 2.0 (95% CI=1.7-2.3).

In chapter 6 the properties are discussed of the 'ecologic case-referent design', introduced in this thesis. This design should provide a reliable post-hoc evaluation of the effectiveness of long-standing, community-wide prevention activities, that show effect only after a prolonged period by comparing individual outcomes with a relatively low incidence between populations in regions with different youth health care programmes.

Chapter 7 gives a short overview of the four different studies and an attempt is made to put these results in a broader perspective. Also, possible explanations of the unexpected adverse effects are discussed. Although nondifferential misclassification can pose a serious problem in the various studies, it is contended that the lack of demonstrable effects at a population level cannot be explained nor legitimised in this way.

In chapter 8, finally, the implications for YHC practice in Dutch Regional Health Services are discussed and recommendations are made for youth health care policy and future research.

The results of the four studies raise serious questions as to the effectiveness of these youth health care activities, with respect to preventive healthcare for schoolchildren in The Netherlands:

- Screening for adolescent idiopathic scoliosis should be reconsidered.
- Because of the contradictory results regarding the effects of open consultation hours on prevention of (para)suicide, mental health problems and influencing health related

behaviour, no unequivocal recommendations can be made in this respect. Possibly, concomitant enhancement of the professional expertise of teachers and student advisors in specific areas can make a positive contribution in this case and prevent some of the adverse effects found.

- Although at a population level (repeated) well-care visits do not seem to advance (mental) health and health related behaviour in schoolchildren, by targeting only particular regions or groups of population at risk, these activities perhaps can have the intended positive effect on certain health outcomes.

Further studies are needed to assess the effectiveness of these and other youth health care activities, thereby furthering the implementation of evidence-based youth health care.

SAMENVATTING

Sinds het aanstellen van de eerste 'echte' schoolarts in Zaandam in 1904 is er veel veranderd in de Jeugdgezondheidszorg. Aanvankelijk was het werk van de schoolarts sterk collectief gericht en betrof vooral het verbeteren van de hygiëne en voedingstoestand van de kinderen op scholen met als voornaamste doel de preventie van infectieziekten. In de loop der tijd werd de zorg echter steeds meer individueel van karakter en gericht op het vroegtijdig ontdekken van aandoeningen en afwijkingen. De laatste decennia is er evenwel sprake van een hernieuwde aandacht voor de collectieve taken, zoals GezondheidsVoorlichting en -Opvoeding (GVO) en beïnvloeding van omgevingsfactoren. Daarnaast is er sprake van verhoogde inspanningen ten behoeve van kinderen met een extra risico. Een groot deel van de individugerichte taken is echter blijven bestaan, met name de preventieve gezondheidsonderzoeken (PGO's).

Daar de Wet Collectieve Preventie Volksgezondheid (1990) geen duidelijke voorschriften geeft voor wat betreft de inhoud van de JGZ, zijn er tot op de dag van vandaag grote verschillen in de wijze waarop aan de JGZ vorm wordt gegeven. Vooral individugerichte taken worden qua frequentie en inhoud sterk wisselend ingevuld en zijn onderwerp van voortdurende discussie. Een probleem hierbij is, dat de wetenschappelijke basis voor deze activiteiten ontbreekt en dat het JGZ-onderzoek zich voornamelijk richt op de beste manier waarop diverse onderdelen van (lichamelijk) onderzoek en screeningen kunnen worden uitgevoerd. Mede ingegeven door de dreigende financiële consequenties wanneer wetenschappelijke onderbouwing van de activiteiten uitblijft, is thans een tendens waarneembaar het onderzoek meer te richten op het al dan niet bereiken of bereikt hebben van de gewenste langetermijn effecten en beginnen ook in de jeugdgezondheidszorg kosteneffectiviteitanalyses (KEA's) hun intrede te doen.

Doel en vraagstelling van voorliggend onderzoek is om op populatieniveau de langetermijn effecten te bepalen van een aantal JGZ-activiteiten, voor zover gericht op schoolgaande kinderen. In de samenstellende deelonderzoeken gaat het dan met name om het effect van scoliosescreening, (herhaalde) preventieve gezondheidsonderzoeken (PGO's) en het houden van vrij toegankelijke ('open') spreekuren op scholen voor voortgezet onderwijs. De

onderzoekshypothese is, dat (frequentere) PGO's op basis- en voortgezet onderwijs en het

invoeren van open spreekuren op scholen voor voortgezet onderwijs zullen leiden tot een

verbeterde geestelijke gezondheid en minder gezondheidbedreigend gedrag. Daarbij wordt in

de deelonderzoeken een verbeterde geestelijke gezondheid geoperationaliseerd als een

vermindering van het aantal (para)suï cides en een betere score op een vragenlijst voor het

meten van geestelijke gezondheid. Als uitkomstmaat voor minder gezondheidbedreigend

gedrag wordt gehanteerd: minder gebruik van tabak, alcohol en softdrugs, betere

voedingsgewoonten en een verminderd voorkomen van overgewicht bij dienstplichtige

mannen.

De tweede onderzoekshypothese houdt in dat het uitvoeren van scoliosescreeningen op

scholen zal leiden tot een vermindering van het aantal operaties wegens idiopathische

adolescenten scoliose.

De gegevens voor de onderscheiden deelonderzoeken zijn afkomstig van diverse verschillende

gegevensbronnen.

Voor 62 van de (toentertijd) 63 JGZ-afdelingen in Nederland is vastgesteld wat in de

bestudeerde periode (1987 tot en met 1992) de werkwijze was van de betreffende JGZ wat

betreft frequentie, inhoud en uitvoering van scoliosescreeningen, PGO's en open spreekuren.

Deze gegevens vormen de basis voor de indeling van JGZ diensten naar onafhankelijke

variabelen (de genoemde JGZ-activiteiten). Voor informatie over de verdeling van afhankelijke

variabelen (de uitkomstmaten met betrekking tot de gezondheid) is gebruik gemaakt van

diverse nationale gezondheidsstatistieken en landelijke studies. De motivatie en opzet van het

onderzoek worden in hoofdstuk 1 nader toegelicht.

In hoofdstuk 2 wordt een deelstudie beschreven naar het effect van scoliosescreening op het

aantal operaties wegens idiopathische scoliose. De operatiegegevens werden ontleend aan de

ziekenhuisontslaggegevens, welke beheerd worden door de Stichting Informatievoorziening

Gezondheidszorg (SIG Services).

Uit dit onderzoek blijkt, dat er geen verschil is in de verdeling van het aantal operaties tussen

JGZ-gebieden met en zonder scoliosescreening (OR=1,0; 95% BI=0,7-1,3). De conclusie is

dan ook dat het uitvoeren van scoliose screening op scholen niet aantoonbaar leidt tot het

terugbrengen van het aantal operaties. Deze activiteit dient daarom te worden heroverwogen.

In hoofdstuk 3 wordt een deelstudie beschreven naar het effect van het houden van open

spreekuren op de incidentie van (para)suï cide. Hiertoe is van een drietal gegevensbronnen

gebruik gemaakt: sterftecijfers (CBS), ziekenhuisontslaggegevens (SIG) en gegevens uit een

enquête onder leerlingen van het voortgezet onderwijs (NIBUD).

Uit de gegevens blijkt dat er geen verschillen zijn in de verdeling van (para)suï cides tussen

JGZ-regio's met en zonder open spreekuren (OR variërend van 1,0 met 95% BI=0,7-1,4 tot 1,1

met 95% BI=0,8-1,6 waarbij een OR > 1 een negatief effect aangeeft). Een verontrustende

uitzondering hierop is de invloed op het voorkomen van ziekenhuisopname wegens een

suï cidepoging die dusdanig letsel tot gevolg heeft dat operatieve ingrijpen noodzakelijk is. Hier

blijkt dat in gebieden met open spreekuren significant meer gevallen voorkomen dan in

gebieden zonder deze spreekuren (OR=2,6; 95% BI=1,3-5,2). Het gegeven dat gerichte

deskundigheidsbevordering vanuit RIAGG's[a] wél een significant positief effect heeft op de

incidentie van parasuï cide (OR=0,6; 95% BI=0,4-0,8) suggereert, dat het onderzoek

voldoende sensitiviteit bezit om een eventueel aanwezige invloed van open spreekuren aan te

kunnen tonen.

In hoofdstuk 4 wordt een deelstudie beschreven naar het effect van meer of minder frequente

PGO's, de tijd verstreken sinds het laatste PGO, en open spreekuren op de geestelijke

gezondheid en de algemene gemoedstoestand. Hiertoe wordt opnieuw gebruik gemaakt van

de resultaten van de enquête onder leerlingen van het voortgezet onderwijs.

De gegevens laten geen relatie zien tussen deze indicatoren en (frequente) PGO's of open

spreekuren (OR variërend van 0,9 met 95% BI=0,7-1,1 tot 1,2 met 95% BI=0,9-1,4 waarbij een

OR > 1 een negatief effect aangeeft). Wel blijkt dat wanneer het effect op diverse schooltypes

apart worden geanalyseerd, open spreekuren mogelijk een positief effect hebben op de

geestelijke gezondheid van leerlingen op scholen voor voorbereidend beroepsonderwijs

(OR=0,8; 95% BI=0,6-1,0).

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[a] Regionale Instellingen voor Ambulante Geestelijke Gezondheidszorg

Hoofdstuk 5 beschrijft een deelstudie naar het effect van open spreekuren, meer of minder frequente PGO's en de tijd verstreken sinds het laatste PGO op risicogedrag en eetgewoonten onder leerlingen van het voortgezet onderwijs en op het voorkomen van adipositas bij (dienstplichtige) mannen op 18/19-jarige leeftijd. Hiertoe is gebruik gemaakt van de resultaten van een enquête onder leerlingen van het voortgezet onderwijs en de dienstplichtkeuringsgegevens van het Ministerie van Defensie.

Uit dit deel van het onderzoek blijkt, dat zowel open spreekuren als (frequente) PGO's geen of soms zelfs een negatieve relatie hebben met leefstijlvariabelen als het gebruik van tabak, alcohol en cannabis, en (zelf gerapporteerd) voedingsgedrag (OR variërend van 0,9 met 95% BI=0,8-1,0 tot 1,3 met 95% BI=1,1-1,5 waarbij een OR > 1 een negatief effect aangeeft). Wat betreft de preventie van adipositas is het effect in alle gevallen negatief: met drie PGO's (vergeleken met één) was de Odds Ratio voor adipositas (QI > 27) bij dienstplichtige mannen 2,5 (95% BI=1,7-3,5) en bij aanwezigheid van open spreekuren 2,0 (95% BI=1,7-2,3).

In hoofdstuk 6 wordt nader ingegaan op de eigenschappen van het voor dit onderzoek geï ntroduceerde 'ecologic case-referent study design'. Dit design lijkt een efficiënte manier om onderzoek te doen naar effecten op populatieniveau van langer bestaande, algemeen geaccepteerde, en populatiebreed uitgevoerde interventies.

Hoofdstuk 7 geeft een overzicht van de vier studieonderdelen en brengt een en ander voor zover mogelijk met elkaar in verband. Hier wordt ook dieper ingegaan op mogelijke verklaringen voor de onverwachte negatieve uitkomsten van de verschillende onderdelen: bronnen van vertekening, misclassificatie en verklaringen vanuit de omstandigheden waaronder de diverse activiteiten worden uitgevoerd. Hoewel (non-differentiële) misclassificatie in de beschreven studies een probleem kan vormen, wordt beargumenteerd, dat op basis hiervan het ontbreken van effecten op populatieniveau niet verklaard en zeker niet gelegitimeerd kan worden.

Hoofdstuk 8 tenslotte, gaat nader in op het belang van dit onderzoek en de betekenis die het zou kunnen hebben voor het beleid met betrekking tot de organisatie en werkwijze van de JGZ.

De vier deelstudies doen sterke twijfels rijzen omtrent de effectiviteit van de onderzochte JGZ-activiteiten, wanneer het gaat om de preventieve gezondheidszorg voor Nederlandse schoolkinderen.

♦ Screening voor adolescente idiopathische scoliose dient te worden heroverwogen.

♦ De tegenstrijdige resultaten van de diverse deelstudies laten vooralsnog geen eenduidige uitspraken toe over de effectiviteit van een beleid gericht op het houden van open spreekuren op scholen voor voortgezet onderwijs, waar het gaat om geestelijke gezondheid en beïnvloeding van gezondheid-gerelateerd gedrag van scholieren. Mogelijk kan gerichte deskundigheidsbevordering van leerkrachten en mentoren hieraan een positieve bijdrage leveren en kunnen op deze wijze eventuele negatieve effecten voorkomen worden.

♦ Hoewel PGO's op populatieniveau geen meerwaarde lijken te hebben wanneer het gaat om het verbeteren van (geestelijke) gezondheid en gezondheid-beïnvloedend gedrag, is het niet uitgesloten dat in bepaalde situaties of omstandigheden deze activiteiten toch een positief effect op sommige gezondheidsmaten kunnen hebben.

Verder onderzoek ter evaluatie van de effectiviteit van deze en andere JGZ-activiteiten is noodzakelijk voor een beleid gericht op een 'evidence-based' Jeugdgezondheidszorg.

Dankwoord

Wanneer in een proefschrift gebruik wordt gemaakt van zo vele databronnen hebben ook veel mensen direct en indirect bijgedragen aan de totstandkoming ervan. Ik wil de betrokkenen (zo veel mogelijk) in volgorde van voorkomen in het proefschrift bedanken.

Allereerst gaat uiteraard mijn dank uit naar de vele JGZ-medewerkers, die bereid waren hun medewerking te verlenen aan het onderzoek door geheel belangeloos de gegevens over de werkwijze van hun afdeling ter beschikking te stellen. Schriftelijk via enquêtes en door het toezenden van jaarverslagen, of persoonlijk bij telefonische contacten, altijd waren zij bereid mij te voorzien van gegevens om onduidelijkheden te verhelpen of onjuistheden te verbeteren. Zowel bij het CBS als bij het RIVM hebben meerdere personen mij met raad en daad bijgestaan bij het verkrijgen van relevante data en het beantwoorden van vragen.

Mevrouw Bergmans, werkzaam bij het SIG, was mijn steun en toeverlaat bij het samenstellen van de benodigde data wat betreft de scoliose operaties en gegevens omtrent parasuï cide.

Mijn dank gaat ook uit naar de academische ziekenhuizen, die toestemming gaven voor het gebruik van hun gegevens omtrent de scoliose operaties. Dhr. P. van Loon, orthopedisch chirurg te Arnhem was behulpzaam bij het beantwoorden van allerlei specifieke vragen rond de (chirurgische) behandeling van idiopathische scoliose in Nederland.

Aan de totstandkoming van het hoofdstuk omtrent (para)suï cide hebben vele mensen bijgedragen: Dhr. J.A.Jenner, jeugdpsychiater bij het Academische Ziekenhuis te Groningen bij de keuze van de activiteit die het meest zou bijdragen tot preventie van (para)suï cide en het vaststellen van relevante (psychiatrische) nevendiagnosen, Dhr. H.A.M.Reesink van de RIAGG te Breda voor informatie over de activiteiten van het RIAGG ten behoeve van de preventie van suï cide en Mevr. C.W.M.Kienhorst voor advisering omtrent de verdere uitwerking van het hoofdstuk. Dhr. R. de Zwart en Dhr. M.F.Warnaar van het NIBUD waren behulpzaam bij het verkrijgen van de data van het Nationaal Scholierenonderzoek 1992, die behalve voor het gedeelte over parasuï cide ook konden worden gebruikt voor het hoofdstuk over leefstijl en geestelijke gezondheid.

Bij het Ministerie van Defensie waren een aantal personen betrokken bij het verkrijgen van (de toestemming voor het gebruik van) de gegevens van de dienstplichtkeuringen:

Curriculum Vitae

(Pieter) Auke Wiegersma was born December 18, 1950 in Heverlee (Belgium). After graduating from secondary school (Gymnasium β of the Praedinius Gymnasium, Groningen), he started his medical studies at Groningen, with final examinations in medicine in 1978. In the two years following his medical finals, he worked as an intern at the paediatric ward of the University Hospital Groningen, after which he became a school health physician in Delfzijl. During the following years he was involved in a number of (national) studies, predominantly of motor development in children, which resulted in several joint national and international publications. At the same time, he obtained a registration in Sports Medicine in 1986, an MPH Youth Health Care in 1990 and a degree in Higher Management of Hospitals and Non-profit Organisations in 1991.

Given his research background, the interest for (public health) epidemiology was not surprising. After a brief introduction into this side of Public Health in Wageningen, he obtained his MSc Epidemiology in Rotterdam in 1992. In the mean time, at the Regional Health Service Groningen, he had already made the transition from youth health care to epidemiology.

As youth health care physician and epidemiologist he is a member of various national groups that give shape to youth health care policy, and (further) development of public health epidemiology and health services research. From 1996 onward, he is involved in an EEC-funded research group, that conducts studies of drug use and abuse in youth (DDRAM: Drug Dependence Risk And Monitoring). Also, he works as an expert assessor of projects carried out as part of the EEC Health Promotion Programme 1996-2000, and has recently become a member of the editorial board of the 'Tijdschrift Jeugdgezondheidszorg'. (Dutch Journal for Youth Health Care).

Apart from his work at the Regional Health Service Groningen, he is a part-time co-ordinator of the Public Health Services training programme for medical students, and as such involved in setting up a new and more permanent form of collaboration between the University and Public Health Services.

Stellingen behorende bij het proefschrift

Long-term effects of preventive activities of Youth Health Care
for schoolchildren in The Netherlands

van P.A. Wiegersma

Nijmegen, 5 oktober 1999

1. Het afschaffen van PGO's voor ieder kind is een verworvenheid van de gezondheidszorg voor jeugdigen en niet een afbraak daarvan.

2. De discussie rond handhaving van PGO's wordt meer beheerst door emotionele dan door wetenschappelijke argumenten.

3. Het uitgangspunt dat Jeugdgezondheidszorg meer is dan de som der delen, vereist allereerst een wetenschappelijke onderbouwing van de effectiviteit van de samenstellende activiteiten.

4. De stelregel dat jeugdartsen regelmatig alle kinderen dienen te onderzoeken om het afwijkende te kunnen onderkennen, is voor tweeërlei uitleg vatbaar: óf artsen van andere disciplines functioneren slecht, óf de opleiding tot jeugdarts schiet aanzienlijk tekort.

5. Een wetenschappelijk aangetoond verband tussen risicofactor en gezondsuitkomst is niet hetzelfde als een wetenschappelijke onderbouwing van de effectiviteit van een preventieve maatregel die verondersteld wordt op die risicofactor van invloed te zijn. Deze vanzelfsprekendheid lijkt de Werkgroep Jeugdgezondheidszorg bij de samenstelling van het basistakenpakket te zijn ontgaan.

6. Het invoeren van open spreekuren op scholen voor voortgezet onderwijs kan leiden tot onverwacht negatieve effecten, hetgeen ondersteunende maatregelen bij het invoeren of handhaven ervan noodzakelijk maakt. (dit proefschrift)

7. De capaciteit van Jeugdgezondheidszorg moet niet worden gebaseerd op regionale demografische kenmerken maar op de socio-economische achtergrondvariabelen, vergelijkbaar met het leerlingen-weegsysteem in het onderwijs.

8. Een poging de waarde van de Jeugdgezondheidszorg te onderbouwen met casuï stiek is een belediging van de beroepsgroep.

9. GGD'en dienen vanuit hun specifieke verantwoordelijkheid en expertise meer capaciteit vrij te maken voor evaluatie van uitgevoerde activiteiten en ontwikkeling van nieuwe preventiemethoden.

10. In deze tijd van gematigd hedonisme met zijn bewezen positieve gezondheidseffecten dient een nieuwe gezondheidsmaat te worden ontwikkeld: de HALE – Happiness Adjusted Life Expectancy.

11. De waarschuwing het kind niet met het badwater weg te gooien getuigt van een sterke onderwaardering van kind, ouders en bovenal het milieu.