

STUDIES IN BEHAVIOURAL EPIDEMIOLOGY

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There are many people who have contributed to the papers included in this collection either as co-authors or in other capacities. They are acknowledged in each of the papers. In addition, I should like to thank Professor B. A. Robertson for serving as supervisor for this collection of papers.

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DECLARATION

I, Alan John Flisher, hereby declare that the work comprising this collection of papers is based on my original work (except where indicated otherwise) and that neither the whole work nor any part of it has been, is being, or is to be submitted for another degree in this or any other university.

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A. J. FLISHER

31 August 1994

INTRODUCTION

INTRODUCTION

1. Details of the papers

The following five papers are included in this collection.

Paper 1.

Flisher AJ, Joubert G, Yach D. Mortality from external causes in South African adolescents, 1984 - 1986. *South African Medical Journal* 1992; **81**: 77-80.

Paper 2.

Flisher AJ, Chalton DO. High school dropouts in a working-class South African community: selected characteristics and risk-taking behaviour. *Journal of Adolescence* (in press).

Paper 3.

Flisher AJ, Roberts MM, Blignaut RJ. Youth attending Cape Peninsula day hospitals. Sexual behaviour and missed opportunities for contraception counselling. *South African Medical Journal* 1992; **82**: 104-106.

Paper 4.

Flisher AJ, Parry CDH. Suicide in South Africa. An analysis of nationally registered mortality data for 1984-1986. *Acta Psychiatrica Scandinavica* (in press).

Paper 5.

Flisher AJ, Parry CDH, Bradshaw D, Juritz J. Suicide in South Africa - seasonal variation. *Acta Psychiatrica Scandinavica* (to be submitted).

The manuscripts in press are provided in the exact form in which they were accepted for publication. The manuscript to be submitted for publication is in the form in which it was reviewed by the Editorial Committee of the Medical Research Council; this process

is necessary prior to the manuscript being submitted for publication since two of the co-authors are employed by the Medical Research Council.

Although all the papers have one or more co-authors, in all cases the candidate was the Principal Investigator. He initiated the projects, carried out the necessary literature reviews, supervised almost all the field work (where applicable), and wrote the papers.

Some of this work has been presented (or accepted for presentation) at national and international conferences. Details in this regard are presented in the appendix to this chapter.

2. Description of each paper

In this section, each paper will be described. For each paper, an attempt will be made to: (i) describe the background of the project reported in the paper, including the rationale for embarking on the project; (ii) present brief details of the methodology and results; and (iii) comment on the significance of the work and the scientific contribution that each project has made.

Paper 1.

In 1990, it was decided to embark on a major research initiative involving adolescent health. An appropriate starting point in addressing a neglected area in any aspect of public health is the analysis of the relevant vital statistics (Mausner and Kramer, 1985) if this has not already been undertaken. In South Africa, the causes of death in adolescents had not been studied, although two reports included the 10 - 14-year age group in an analysis of injury-related mortality in South African children (Kibel *et al*, 1990a,b).

The analysis is reported in Paper 1, entitled *Mortality from external causes in South African adolescents, 1984 - 1986*. Mortality data were extracted from computer tapes supplied by the Central Statistical Services. It is necessary to write computer

programmes to obtain the data in which one is interested. Rates were calculated using the 1985 census, adjusted for undercount (Central Statistical Services, 1986).

The focus was on external causes (which include, *inter alia*, homicide, accidents, and suicide) since this category accounted for the bulk of the adolescent deaths. The category with the second highest proportion of deaths was symptoms, signs and ill-defined conditions, which accounted for 10,0% of all adolescent deaths. Notwithstanding this, an analysis (using the same data set) of the deaths from infectious and parasitic diseases in South African adolescents was published separately (Flisher *et al*, 1992).

There were 16 348 reported deaths of adolescents in the three-year period 1984-1986, of which 56,8% were due to external causes. There were many more of these deaths in late adolescence (15 - 19 years) than early adolescence (10 - 14 years). More boys than girls died from external causes; this trend was more marked in late adolescence (53,1% compared to 35,6% in early adolescence, and 73,5 compared to 37,4% in late adolescence).

Road deaths were the most common external cause of death for all population groups in the 10 - 14-year age group; however, in the 15 - 19-year age group assault was the most common external cause of death for coloureds and blacks, with road deaths still being the most common external cause of death for whites and Asians. These discrepancies are also reflected by the risk ratio for assault for coloureds being 12,0 in relation to whites in late adolescence, whereas the risk ratio for Asians in relation to whites is 2,1. A similar trend is present for the 10 - 14-year age group although it is not as marked.

In summary, the results show that the extent of mortality in South African adolescents is high. This fact, together with the unequal distribution of deaths between age group, gender, and population group, indicates that many of these deaths may be preventable. Although the influence of sociological factors should not be underestimated, it is possible that *risk-taking behaviour* contributes to a large proportion of these deaths.

Clearly, the results reported above give only a partial impression of the consequences of adolescent behaviour. Not only may death from certain behaviour occur after adolescence (for example, unsafe sexual practices resulting in HIV infection and subsequent death from AIDS), but habits acquired in adolescence may persist into childhood and hence have fatal consequences. Furthermore, many of the adverse consequences of adolescent behaviour are not fatal, for example the consequences of non-fatal physical trauma. It is thus necessary to complement mortality data by investigating the actual behaviour that might contribute to morbidity and mortality.

Paper 2

The consideration that risk-taking behaviour could contribute to a large proportion of the morbidity and mortality of adolescents formed part of the rationale for a project in which the extent of risk-taking behaviour in a representative sample of 7 340 high-school students in the Cape Peninsula was documented (Flisher *et al*, 1993a-i). Forms of risk-taking behaviour studied included: suicidal behaviour, cigarette smoking, alcohol abuse, drug use, road-related behaviour, interpersonal violence, and sexual behaviour.

A methodological limitation of this study is that only adolescents still attending school were included. This is an important limitation since: (i) a large proportion of South African children begin school but do not complete standard 10 (for example, the proportion of blacks who began school but dropped out before completing standard 10 was 72,1% in 1990)(Central Statistical Services, 1991); and (ii) it is possible that the incidence of risk-taking behaviour is higher among dropouts. Related to this is the fact that there is a lack of basic descriptive data regarding South African school dropouts. It was thus decided to carry out the project reported in Paper 2, entitled *High-school dropouts in a working-class South African community: selected characteristics and risk-taking behaviour*.

At the time of carrying out this study, there were only five studies that could be identified in the world literature in which the incidence of risk-taking behaviour of school dropouts was compared to that of age-matched adolescents still attending school (Chavez *et al*, 1989; Eggert *et al*, 1990; Kandell, 1975; McKirman and Johnson, 1986; Pirie *et al*, 1988). These studies were all carried out in the USA; furthermore, with the

exception of the study by Chavez *et al.* (1989) in which violent behaviour was studied, all the studies restricted their focus to various types of substance use. This study is thus the first outside of the USA in which a wide range of risk-taking behaviour of school dropouts is compared with an age-matched sample of adolescents attending school.

One of the reasons for the dearth of studies in which the incidence risk-taking behaviour of school dropouts is documented is that dropouts are extremely hard to reach (Kandell, 1975). This makes it difficult to obtain samples that are large enough for statistical analysis.

The dropout sample was defined as all teenage school dropout children of the heads of the households on a stratified sample of 1000 even in a community. The prevalence of the risk-taking behaviour were obtained by an anonymous self-completed questionnaire. The extent of risk-taking behaviour was compared with that of age-matched students attending a local high school using odds ratios. The method of logistic regression was used to obtain the odds ratios adjusted for age.

The field work was completed by two fieldworkers, one of whom was a registered nurse, working full-time for an eight month period.

Data were available for 68 dropouts and 332 teenagers still attending school. The trends were for those still attending school to be more likely to engage in suicidal behaviour but less likely to use substances such as cigarettes, methaqualone ("Mandrax"), and alcohol. Girls still attending school were less likely to have had sexual intercourse than the dropouts.

It is concluded in the study that school-based intervention programmes need to address not only risk-taking behaviour but also the inter-related phenomenon of dropping out. The following project addresses the issue of how to provide preventative services to adolescents who have already dropped out of school.

Paper 3.

School dropouts are relatively difficult to involve in health promotion efforts. Since many adolescents attend day hospitals for medical reasons, it was decided to investigate the potential of day hospitals to provide interventions aimed at reducing the incidence of risk-taking behaviour.

A pilot study was undertaken at one day hospital to determine whether there would be any problems with the methodology of having interviews with young people as they leave the day hospital (Flisher *et al*, 1991). In these interviews, they were asked about whether they engage in certain forms of risk-taking behaviour, and their attitude towards intervention regarding these behaviours at day hospital level. The pilot study indicated no substantial methodological problems. In addition, it was found that risk-taking behaviour with regard to sexuality and substance use was prevalent at that particular day hospital and that a large proportion were willing to accept help for these problems. It was thus decided to go ahead with Study 3, entitled *Youth attending Cape Peninsula day hospitals. Sexual behaviour and missed opportunities for contraception counselling*. The focus was narrowed to include sexual behaviour only since the day hospital are already equipped to provide preventative services in this regard.

At the time that this study was carried out, a systematic literature search was unable to unearth any studies in the world literature involving the extent of missed opportunities for contraception counselling at primary health care level. However, the extent of missed opportunities for immunisation at primary health care level had been documented in various countries (Expanded programme on Immunisation, 1989; Yach *et al*, 1991).

Questionnaires were completed by a sample of youth (aged 15 - 24 years) attending day hospitals in the Cape Peninsula. Of the total sample of 225, 28,9% were attending educational institutions; 43,6% had a highest educational qualification of standard 6 or less; and 23,8% were unemployed. It was found that 43,6% of those who had experienced sexual intercourse and 43,9% of those who had not did not receive contraceptive intervention yet would have liked to do so.

In addition, selected determinants of missed opportunity were investigated using a stepwise logistic multiple regression model. It was found that of those who had not had sexual intercourse, younger respondents, and students were more likely not to have received contraception intervention despite wanting such intervention.

The principal recommendation arising from the study was that all youth attending primary health care facilities should routinely be offered contraception counselling. A meeting was subsequently held with the senior managers responsible for the day hospitals to explore ways in which these results could be implemented.

Paper 4

The incidence of death from suicide among adolescents was documented in the analysis of death from external causes in South African adolescents (Paper 1). Completed suicide is only one outcome of suicidal behaviour. Partly for this reason, the study involving risk-taking behaviour of Cape Peninsula high school students (Flisher *et al*, 1993b) as well as that involving high-school dropouts (Paper 2) included non-fatal suicidal behaviour (such as suicidal intent and previous suicide attempts).

In carrying out these projects, it became clear that there are no methodologically sound studies in which the epidemiology of suicide in South Africa is documented. This information is necessary to inform attempts to reduce the incidence of this form of death, and to focus research efforts. Furthermore, national suicide mortality can provide insights into the mental health status of a country. It was thus decided to do the project described in Paper 4, entitled: *Suicide in South Africa. An analysis of nationally registered mortality data for 1984 - 1986.*

This paper had the following aims: (i) to provide an overall assessment of the extent of suicide by documenting the suicide proportional mortality and suicide rates according to gender, age, and population group (as defined by the Population Registration Act of 1950); and (ii) to document the methods of suicide and ratios of suicide to homicide according to these demographic variables.

The methodology was similar in certain respects to that used for Paper 1, in which external cause mortality in South African adolescents was described. Mortality data were extracted from computer tapes supplied by the Central Statistical Services, and rates were calculated using the 1985 census, adjusted for undercount (Central Statistical Services, 1986). An analysis of variance (ANOVA) was performed on the logit (logistic transformation) of the suicide rate in order to understand the relationship between age, gender, and population group (and the interaction between these variables) and suicide.

It was found that there were 5 448 deaths (1,3%) of people aged 15 years and older due to suicide in the period 1984 - 1986. Proportional mortality and mean annual suicide mortality rates were highest for whites, followed by Asians and then coloureds. The proportional mortality for blacks was similar to that for coloureds. Suicide was relatively prominent as a cause of death for Asian females aged 15 - 24 years. The ANOVA indicated a greater effect for population group and gender main effects than for the other sources of variance.

For whites, the most common method of suicide was firearms. Except for coloured females, hanging was the most common method used for the other population groups. It was speculated that political, economic, and religious factors may account for some of the differences, while cultural factors may explain the findings for young Asian females. The results provide support for strict gun control legislation (Lerer and Hansson, 1993) since firearms are prominent as a method of suicide in South Africa (particularly for whites for whom the proportional suicide mortality and suicide rate are relatively high).

There were two important aspects of the epidemiology of suicide that were not investigated for this project. *Firstly*, longitudinal trends were not included. This is an important omission since the period 1984 - 1986 was a period of much social disruption in South Africa. Furthermore, it is necessary to monitor trends in suicide mortality in the light of the changing political and economic scenario in South Africa. A further study is in progress that has the aim of documenting longitudinal trends in suicide mortality in South Africa. *Secondly*, the seasonal variation in suicide mortality was not studied. This aspect was addressed in Paper 5.

Paper 5.

Monthly variation is an important dimension of the epidemiology of suicide since it can provide clues as to the aetiology and hence prevention of suicide. Although seasonal variation in suicide has received attention in the world literature over the past century (Massing and Angermeyer, 1985), this is the first study in South Africa in which this phenomenon is examined. The title of Paper 5 is: *Suicide in South Africa. Seasonal variation.*

The mortality data for 1980-1989 (which is the most recent decade for which data are available) were analysed using log-linear modelling. This technique makes no distinction between independent and dependent variables, but is used to examine relationships between categorical variables by examining expected cell frequencies (Bishop *et al*, 1975). Goodness of fit of the model was measured by the Pearson Chi-squared statistic.

Trends that have been observed internationally include: (i) a peak in spring or early summer and a trough in winter (Massing and Angermeyer, 1985); and (ii) variation in the seasonal suicide pattern according to age (Massing and Angermeyer, 1985) and gender (Meares *et al*, 1981; Micciolo *et al*, 1989; Nayha, 1982; Parker and Walter, 1982). Although the former trend was confirmed in South Africa, this was not the case for the latter trend. However, it was found that the winter trough and the summer peak were more pronounced for those classified as coloured or black. It was hypothesised that the fact that coloureds and blacks are less urbanised could account for these findings since they are more exposed to seasonal variations in environmental influences and social integration. The summer peak for these groups may be partly due to the influence of Christmas in that existing hardship may be intensified.

The results may have implications for studies conducted in other parts of the world. As indicated above, the reasons for the differences between the population groups probably reflect social, cultural, and economic factors. This suggests that these factors should be taken into account in analyses of the monthly distribution of suicide in other countries as well. It is possible that this may contribute to elucidating the reasons for international differences in monthly trends.

3. Summary

Mortality from external causes in South African adolescents (Paper 1) was investigated as the initial step in a research effort involving adolescent health. These data formed part of the rationale for investigating risk-taking behaviour of Cape peninsula high school students. This study had the methodological limitation that only adolescents still attending school were included. It was thus decided to embark on a study in which the risk-taking behaviour of school dropouts was compared to that of teenagers still attending school (Paper 2). Dropouts are difficult to reach for the purposes of preventive interventions. The potential of primary health care facilities in this regard was thus studied (Paper 3). It transpired while reviewing the literature for Papers 1 and 2 that there is a dearth of data regarding the epidemiology of suicide in South Africa. This led to the production of Papers 4 and 5, which comprised analyses of South African nationally registered suicide mortality data for 1984 - 1986 and suicide seasonal variation respectively.

In conclusion, the papers comprising this collection represent some of the outcomes of an intellectual process that began in 1990. They have all produced new findings in priority areas in the field of behavioural epidemiology in South Africa.

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5. Appendix for the Introduction.

CONFERENCE PRESENTATIONS BASED ON THE PAPERS COMPRISING THIS COLLECTION

Flisher AJ, Chalton DO. School dropouts in a working-class community in Cape Town: I. Selected characteristics. Ninth National Congress of Child and Adolescent Psychiatry, Cape Town, 1993.

Flisher AJ, Chalton DO. Risk-taking behavior of South African school dropouts. 41st Annual Meeting of the American Academy of Child and Adolescent Psychiatry, New York City, 1994. Also presented under the title: School dropouts in a working-class community in Cape Town: II. Risk-taking behaviour at the Ninth National Congress of Child and Adolescent Psychiatry, Cape Town, 1993.

Flisher AJ, Joubert G, Yach D: Externally caused deaths of South African adolescents: 1984-1986. Ninth Epidemiological Conference, East London, 1990.

Flisher AJ, Parry C. Suicide in South Africa: An analysis of nationally registered mortality data for 1984-1986. Seventh National Psychiatric Congress, Bloemfontein, 1992.

Flisher AJ, Roberts MM, Blignaut R. Youth attending Cape Peninsula day hospitals: Sexual behaviour and missed opportunities for contraception counselling. Tenth Epidemiological Conference, Cape Town, 1991.

Paper 1

Mortality from external causes in South African adolescents, 1984 - 1986

Mortality from external causes in South African adolescents, 1984 - 1986

A. J. FLISHER, G. JOUBERT, D. YACH

Summary

The external causes of death in South African adolescents are described. Nationally registered mortality data for 1984 - 1986 were used to calculate proportional mortality. Mortality rates were also calculated, except in the case of black deaths, since these deaths are known to be under-registered and the estimated population figures are known to be inaccurate. Of the 16 348 adolescent deaths registered in 1984 - 1986, external causes accounted for 56,8% and symptoms, signs and ill-defined conditions for 10,0%. A greater proportion of girls died from symptoms, signs and ill-defined conditions whereas a greater proportion of boys died from external causes. A larger proportion of black adolescent deaths were categorised as symptoms, signs and ill-defined conditions. The risk of death by external cause for coloureds aged 15 - 19 years was 1,7 that of whites, while in the 10 - 14-year age group it was the same as that of whites. In the 15 - 19-year age group assault was the most common external cause of death in blacks and coloureds, compared with road accidents for whites. The highest number of deaths by external cause per day occurred over the Christmas period. The analysis indicated that mortality rates in South African adolescents are high and that many deaths may be the result of risk-taking behaviour. With the increasing urbanisation of blacks, the impact of external causes of death can be expected to increase further.

S Afr Med J 1992; 81: 77-80.

The period of transition from childhood to adulthood, viz. adolescence, has not attracted a great deal of attention in the discipline of public health either in South Africa or internationally. The fact that adolescents comprise a relatively healthy section of the population and the tendency of health professionals to give priority to preventing pathological conditions arising from infectious diseases in childhood has contributed to this situation.¹ But there are aspects of the South African scenario that make it particularly necessary to devote attention to adolescent health. These include: (i) adolescents being confronted not only with their personal developmental tasks but also with the far-reaching social and political changes that are taking place in South Africa, resulting in instability and, hence, health-damaging behaviour (such as substance abuse and interpersonal violence); and (ii) the high urbanisation rate which exposes an increasing proportion of South African adolescents to hazards such as traffic accidents.² An appropriate starting point in terms of paying greater attention to the epidemiological aspects of adolescent health is the analysis of routinely available data, for example mortality data. Despite the fact that the 7,75 million adolescents in South

Africa constitute 22% of the total population,³ there have been no analyses of South African mortality data that focus on adolescents. (Two recent reports^{4,5} included the 10 - 14-year age category in an analysis of injury-related mortality in South African children.) This article describes the causes of death in South African adolescents focusing on external causes.

Methods

The World Health Organisation definition of adolescence,⁶ namely the age range 10 - 19 years, will be used. Adolescence is divided into early adolescence (10 - 14 years) and late adolescence (15 - 19 years). Mortality data were extracted from computer tapes supplied by Central Statistical Services (CSS). Deaths occurring in the years 1984 - 1986 were studied; a 3-year period was chosen because more reliable information would be provided by a relatively long time period, given the large fluctuations in mortality rates that can occur from year to year, particularly in the adolescent age group.^{5,7} Information for later years is not yet available. The 'homelands' of Bophuthatswana, Ciskei, Transkei and Venda were excluded from the analysis, since CSS does not provide these statistics. Selected data are presented by population group, as defined by the Population Registration Act of 1950. Although there are dangers of presenting the data according to population group and although these groups do not have anthropological or scientific validity,⁸⁻¹¹ they are used because there are important differences between the groups for many indicators of health (mediated by political and economic factors).^{8,11-13} Causes of deaths are classified according to a system¹⁴ based on the *International Classification of Diseases (ICD)* (9th revision).¹⁵ The category 'symptoms, signs and ill-defined conditions' (ICD main category XVI) was used when the certifying medical practitioner or other official was not able to specify a cause of death, and it includes sudden death of unknown cause. The category 'external causes' (ICD main category XVII) includes accidents, poisoning and violence; if a death in this category cannot be ascribed to a specific external cause, it is coded as 'undetermined' whether it is accidentally or purposely inflicted. Thirty-nine children who died after the bus in which they were travelling plunged into a dam in March 1985 were classified as having died from drowning according to the data provided by CSS, although the cause of their death was a road accident; for the purposes of this article, these deaths have been reclassified as road deaths. Rates were calculated using the 1985 census, adjusted for undercount;¹⁶ however, rates for blacks were not calculated because of the poor quality of both numerator and denominator data.^{17,18}

The mortality rates for whites, coloureds and Asians were used to calculate *risk ratios* within each age group for each major cause or for all deaths by using the white mortality rate as the reference and calculating the ratios for the other statutory groups accordingly.

Results

There were 16 348 reported deaths of adolescents in the 3-year period 1984 - 1986. The proportion of deaths due to

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the major categories is given in Table I; only those categories that accounted for more than 5% of the deaths in either early adolescence or late adolescence are included.

TABLE I. DEATHS DUE TO MAJOR CAUSES AMONG ADOLESCENTS BY AGE GROUP IN SOUTH AFRICA, 1984 - 1986

ICD major cause (category number)	10 - 14 yrs		15 - 19 yrs	
	No.	%	No.	%
Infectious and parasitic diseases (I)	636	11,8	698	6,4
Nervous system and sense organs (VI)	371	6,9	493	4,5
Circulatory system (VII)	285	5,3	546	5,0
Respiratory system (VIII)	401	7,4	533	4,9
Symptoms, signs and ill-defined conditions (XVI)	594	11,0	1 038	9,5
External (XVII)	2 491	46,2	6 797	62,0
Other	614	11,4	851	7,8
Total	5 392	100,0	10 956	100,0

The proportion of deaths was greater than or equal to 10,0% for only two major causes: external causes (56,8% of all adolescent deaths); and symptoms, signs and ill-defined conditions (10,0% of all adolescent deaths) (Table I). For both these groups, there were many more of these deaths in late adolescence compared with early adolescence. In this article only deaths due to these two major causes will be discussed further.

Table II provides the proportions of deaths due to symptoms, signs and ill-defined conditions and external causes by age group and sex. A greater proportion of girls died from symptoms, signs and ill-defined conditions, while for external causes boys had the higher proportion. These trends were more marked in late adolescence.

The population group-specific proportions of deaths and death rates for symptoms, signs and ill-defined conditions and external causes are given in Table III. In both age groups, greater proportions of deaths are accounted for by symptoms, signs and ill-defined conditions for blacks than is the case for the other statutory groups; this tendency is most marked in young adolescence where 14,1% of the black deaths were ascribed to this category, whereas the corresponding figure for whites was only 1,3%. Conversely, in both age groups smaller percentages of deaths in blacks were accounted for by external causes than was the case for the other statutory groups. From the mortality rates (Table III) it can be seen that for total deaths the risk ratio for coloureds in relation to whites was 1,8

in the 10 - 14-year and 15 - 19-year age groups, whereas for Asians the corresponding figure was 1,3 for the 10-14-year age group and 1,1 for the 15 - 19-year age group. For deaths by external causes the risk for coloureds was the same as that for whites in the 10 - 14-year age group and 1,7 that of whites in the 15 - 19-year age group. The mortality rates for external causes for whites and Asians were similar to each other in both age groups. Table III reveals that the risk for coloureds and Asians was higher than that for whites in both age groups for symptoms, signs and ill-defined conditions.

Road accidents are the most common external cause of death for all population groups in the 10 - 14-year age group (Table IV); however, in the 15 - 19-year age group assault is the most common external cause of death for coloureds and blacks, with road deaths still being the most common external cause of death for whites and Asians. Large differences between the population groups also exist for drowning in the younger age group (with coloureds and blacks having proportionately more deaths than whites and Asians) and for suicide (with whites and Asians having proportionately more deaths than coloureds and blacks).

The mortality rate for assault in the 15 - 19-year age group is 62,2/100 000 for coloureds; this corresponds to a risk ratio of 12,0 in relation to whites, whereas the risk ratio for Asians in relation to whites is 2,1 (Table IV). A similar trend is present for the 10 - 14-year age group but it is not as marked. For road accident-related deaths in the 15 - 19-year age group, whites have the highest rate of 48,6/100 000. The proportion of boys who die from assault is greater than that for girls. This trend is most marked in late adolescence, where 41,6% of boys die from assault compared with 20,7% of girls; the percentages for early adolescence are 11,7% and 7,1%, respectively. The converse is true for road accident deaths for which the overall percentages are 24,7% and 33,1% for boys and girls, respectively.

Table V gives, by age group, the number of deaths per day for all external causes for the Christmas holiday periods and the Easter weekends, public holidays, weekends (including Fridays) and other days. The incidence of non-natural deaths was highest over the Christmas holiday periods followed by public holidays for both age groups, but the rank order varies between the age groups after that.

The highest percentage of adolescent drowning deaths took place in January (19,9); the percentage then decreased month by month until July (1,6) before increasing month by month until January.

Discussion

The results presented above give only a partial impression of the fatal consequences of adolescent behaviour. Not only may death resulting from certain behaviour occur after adolescence

TABLE II. CAUSES OF DEATHS AMONG ADOLESCENTS DUE TO EXTERNAL CAUSES AND SYMPTOMS, SIGNS AND ILL-DEFINED CONDITIONS BY AGE GROUP AND SEX IN SOUTH AFRICA, 1984 - 1986

	10 - 14 yrs				15 - 19 yrs			
	Boys		Girls		Boys		Girls	
	No.	%	No.	%	No.	%	No.	%
External causes	1 733	53,1	758	35,6	5 494	73,5	1 303	37,4
Symptoms, signs and ill-defined conditions	320	9,8	274	12,9	531	7,1	507	14,5
Others	1 208	37,0	1 099	51,6	1 446	19,4	1 675	48,1
Total	3 261	100,0	2 131	100,0	7 471	100,0	3 485	100,0

TABLE III. PROPORTIONAL MORTALITY AND MORTALITY RATES/100 000 FOR EACH AGE GROUP/POPULATION GROUP FOR SYMPTOMS, SIGNS AND ILL-DEFINED CONDITIONS, EXTERNAL CAUSES AND TOTAL DEATHS IN SOUTH AFRICA, 1984 - 1986

	10 - 14 yrs						
	Whites (N = 531)		Coloureds (N = 777)		Asians (N = 147)		Blacks (N = 3 937)
	PM*	MR†	PM	MR	PM	MR	PM‡
Symptoms, signs and ill-defined conditions	1,3	0,5	3,2	2,3	5,4	2,7	14,19
External causes	59,9	23,5	59,3	42,9	53,7	26,6	41,5
Total deaths	100,0	39,2	100,0	72,3	100,0	49,4	100,0
	15 - 19 yrs						
	Whites (N = 1 377)		Coloureds (N = 1 944)		Asians (N = 317)		Blacks (N = 7 318)
	PM*	MR†	PM	MR	PM	MR	PM‡
Symptoms, signs and ill-defined conditions	2,3	2,4	3,6	6,8	6,0	7,0	12,5
External causes	81,9	87,1	69,8	131,9	65,6	76,7	56,1
Total deaths	100,0	106,3	100,0	189,1	100,0	116,9	100,0

* Proportional mortality.

† Mortality rate.

‡ Mortality rates not valid for blacks (see text).

(for example, unsafe sexual practices resulting in HIV infection and subsequent death from AIDS), but habits acquired in adolescence may persist into adulthood and hence have fatal consequences (for example, smoking resulting in lung carcinoma). It must be borne in mind that mortality data may accumulate inaccuracies at several stages of the recording procedure:

1. There are a number of deaths that are not registered.^{16,17} The results presented above thus give low estimates of the numbers of adolescent deaths.

2. The nosologists at the CSS may not be able to select the appropriate underlying cause of death, since the cause of death on the death certificate may be inadequately completed, may

use terms for which no codes are available, or may use several terms with no apparent order.¹⁹

3. The diagnosis is often of a poor quality; an analysis of the 1984 mortality for South Africans of all ages found that more than 20% of all registered deaths of blacks were ascribed to symptoms, signs and ill-defined conditions.¹⁸ That this consideration is relevant for the results presented in this article is indicated by the fact that this category was the second most frequently coded as the major cause of death; furthermore, it would appear to be female subjects and blacks who are more likely to receive this coding. The situation is exacerbated by some evidence of systematic misclassification.¹⁷

Clearly, it is necessary to exercise some caution in interpreting the results in the light of these inadequacies in the

TABLE IV. PROPORTIONAL EXTERNAL CAUSE MORTALITY AND MORTALITY RATES/100 000 FOR EACH AGE GROUP/POPULATION GROUP FOR VARIOUS EXTERNAL CAUSES IN SOUTH AFRICA, 1984 - 1986

	10 - 14 yrs						
	Whites (N = 318)		Coloureds (N = 461)		Asians (N = 79)		Blacks (N = 1 633)
	PM	MR	PM	MR	PM	MR	PM
All road-related	52,2	12,3	39,5	16,9	41,8	11,1	28,7
Drowning	6,3	1,5	25,2	10,8	12,7	3,4	24,2
Undetermined	11,6	2,7	11,1	4,7	26,6	7,1	15,6
Assault	7,5	1,8	9,3	4,0	6,3	1,7	11,3
Suicide	9,1	2,1	2,0	0,8	5,1	1,3	1,3
Fire	2,2	0,5	3,3	1,4	5,1	1,3	5,9
Poisoning	1,3	0,3	0,7	0,3	2,5	0,7	10,9
Other	9,7	2,3	9,1	3,9	0,0	0,0	10,9
	15 - 19 yrs						
	Whites (N = 1 128)		Coloureds (N = 1 356)		Asians (N = 208)		Blacks (N = 4 105)
	PM	MR	PM	MR	PM	MR	PM
All road-related	55,9	48,6	22,0	29,0	31,3	24,0	16,2
Drowning	4,2	3,6	9,7	12,8	12,5	9,6	6,3
Undetermined	13,4	11,7	11,0	14,5	16,8	12,6	17,4
Assault	5,9	5,2	47,1	62,2	14,4	11,1	44,1
Suicide	13,1	11,4	2,6	3,4	16,3	12,5	3,1
Fire	0,9	0,8	1,1	1,5	3,4	2,6	3,1
Poisoning	1,5	1,3	0,7	1,0	0,5	0,4	0,9
Other	5,1	4,5	5,8	7,7	4,8	3,7	8,6

TABLE V. NO. OF DEATHS PER DAY FOR ADOLESCENTS FOR ALL EXTERNAL CAUSES FOR THE CHRISTMAS HOLIDAY PERIODS AND THE EASTER WEEKENDS, PUBLIC HOLIDAYS, WEEKENDS (INCLUDING FRIDAYS) AND OTHER* BY AGE GROUP IN SOUTH AFRICA, 1984 - 1986

	10 - 14 yrs	15 - 19 yrs
Christmas holiday periods	3,8	13,6
Easter weekends	2,7	6,8
Public holidays	2,8	7,8
Weekends (Including Fridays)	2,4	7,6
All other days	2,1	5,1

* Each day was counted only once; the order of precedence corresponds to the order of types of day in the table (for example, if Christmas day was on a weekend it was only counted as Christmas day and if a public holiday was on a weekend it was only counted as a public holiday).

data. In the case of Asians, there is an additional reason for caution in that there is a relatively small number of deaths.

The largest component of adolescent mortality was death from external causes, a finding that is consistent with previous studies in both the developed^{12,20,21} and the developing²² world. Also consistent with previous studies^{12,13,20,23-26} is the observation that a greater proportion of boys than girls died from external causes. This may be due to differences in motor-skill development;²⁶ differences in socialisation resulting in differences in behaviour and exposure to risk;²⁷ and differences in reporting.²⁶ The last explanation is compatible with the finding that a greater proportion of girls died from symptoms, signs and ill-defined conditions.

The relatively low proportion of blacks dying from external causes may be related to infectious diseases being relatively less well controlled and their having a lower level of urbanisation than the other population groups.²⁸ They are thus not exposed to the same extent to many of the risks encountered in an urban environment, such as assault and road accidents.²⁹ Notwithstanding this, blacks are becoming urbanised at a particularly high rate, and it can thus be expected that the proportion of deaths due to external causes will rise.²²

The mortality rates both for all deaths and for external causes for white South African adolescents are considerably higher than for adolescents in the developed world; for example, the overall mortality rate in the USA was 28/100 000 for the 10 - 14-year age group and 81/100 000 for the 15 - 19-year age group.²¹ The mortality rates for white and Asian South African adolescents are, however, lower than for coloured adolescents, both overall and for external causes. Socio-economic factors have been shown to have a considerable impact on the mortality rates of adolescents in other countries (especially for external causes),^{12,13,25,30} and it is likely that these factors account for a large part of the differences documented in this article.

The importance of road accident-related deaths in relation to other external causes has been documented throughout the world.⁷ Furthermore, the trends with regard to population group-specific skewing of assault statistics found in this study have been documented in two previous South African studies (A. Butchart *et al.* — unpublished document).²⁷

The high number of deaths from external causes over the Christmas holiday periods implies that preventive activities should be more intensive during this time. In South Africa, the peak of the summer season corresponds to the period during which the most deaths from drowning occur; it would thus be appropriate for media efforts to prevent drowning to focus on the beginning of summer.

In conclusion, this analysis has indicated that mortality rates in South African adolescents are high. Although the influence of sociological factors should not be underestimated, risk-taking behaviour may contribute to many of these deaths. An analysis of the prevalence of such behaviour in adolescents in the Cape Peninsula is at present being undertaken. These data will be used for information in the development of prevention strategies.

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Paper 2

**High school dropouts in a working-class South African community:
selected characteristics and risk-taking behaviour.**

HIGH-SCHOOL DROPOUTS IN A WORKING-CLASS

SOUTH AFRICAN COMMUNITY:

SELECTED CHARACTERISTICS AND RISK-TAKING BEHAVIOUR

(Revised version)

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The aims of the project were: (1) to document selected characteristics of teenage school dropouts in a working-class South African community; and (2) to compare the prevalence of the risk-taking behaviour of the dropouts with those attending school.

Of the 548 teenagers sampled, 15.9% were dropouts; of these 62.1% left school after less than 9 years of schooling. Those still attending school were more likely to engage in suicidal behaviour but less likely to abuse substances and (for girls) to have had sexual intercourse.

Intervention needs to begin in primary school and address the inter-related phenomena of dropping out and risk-taking behaviour.

INTRODUCTION

South African school dropout figures reflect a dismal scenario of inequality, poverty, and wasted human potential. Although official statistics indicate a steady improvement over the years (Central Statistical Services, 1991) premature dropout remains a serious problem. The proportions of students of each population group (as defined by the Population Registration Act of 1950) who began high school but dropped out before completion in 1990 are as follows: whites - 17.1%; Asians - 32,3%; coloureds - 60.2%; and blacks - 33.6% (Central Statistical Services, 1991). The relatively low percentage of black students who dropped out of high school obscures the true extent of the problem in this population group for the following reasons: (1) if primary and high school data are combined, the dropout rate for blacks spirals to 72,1%; and (2) 24% of black adults have never attended school at all (Cape Times, 1990).

A high proportion of South African adolescents are thus being exposed to the adverse consequences of not completing their schooling. These include: (1) having a low level of academic skills (Alexander et al, 1985); (2) reduced probability of securing steady employment and an adequate income, both in the short and long term; (3) poorer mental and physical health either directly or indirectly (through unemployment and low income) (Donovan and Oddy, 1982; Ichilov, 1978; Jackson et al, 1983; Rumberger, 1987; Stafford et al, 1980); and (4) an increased use of psychiatric and social services due to drug-related problems (Holmberg, 1985).

However, it has been suggested that dropping out of school does not necessarily have negative consequences in that some dropouts may choose alternatives that are more fulfilling and rewarding than attending school (Rumberger, 1987; Tidwell, 1988).

Leaving school prematurely also has important negative consequences for society. Examples of this include: (1) forgone national income and tax revenues (Rumberger, 1987); (2) increased demand for social services; and (3) increased crime rates (Rumberger, 1987).

Despite these adverse individual and social consequences, there is a dearth of studies providing basic descriptive data regarding South African high-school dropouts. Clearly, these data are necessary to underpin prevention efforts. Two objectives of the study were as follows: (1) to determine the proportion of teenage children in a working-class South African community who have dropped out of school; and (2) for those who have dropped out of school, to describe some demographic details, the ages at which they stopped attending school, the reasons that they dropped out, and their employment status.

Risk-taking behaviour can have adverse individual and social consequences. This is pertinent since several studies have concluded that dropping of school is a risk factor for risk-taking behaviour such as various forms of substance abuse and violent behaviour (Chavez *et al*, 1989; Eggert *et al*, 1990; Kandell, 1975; McKirnan and Johnson, 1986; Pirie *et al*, 1988). However, almost all studies in which the prevalence of adolescent risk-taking behaviour is described have had

sampling frames confined to adolescents attending school. The findings thus obtained are not generalisable to adolescents as a whole. This limitation was present in a recent study in which the prevalence of a wide range of risk-taking behaviour in high-school students in the Cape Peninsula, South Africa, was determined (Flisher et al, 1993 a-h). Additional objectives were thus to attempt to redress this deficiency by documenting the prevalences of various forms of risk-taking behaviour of those teenagers who have dropped out of school, and to compare these prevalences with those pertaining to a school situated in that community.

METHOD

Instruments

Information regarding the number of teenagers in the household, the number who had dropped out of school, and certain characteristics of these drop outs was obtained from the household heads (or their spouses) by two fieldworkers using a structured questionnaire. In addition, the dropouts themselves completed a questionnaire in which they were asked if they engaged in a variety of forms of risk-taking behaviour. This latter questionnaire was identical to that used in the study mentioned above in which risk-taking behaviour of Cape Peninsula high-school students was investigated (Flisher et al, 1993 a-h), except that items that did not apply to dropouts were deleted (for example, those

dealing with incidents occurring at school). The questionnaires were available in both of the languages (Afrikaans and English) spoken in the area. It takes approximately 20 minutes to complete and requires mainly yes/no answers. The risk-taking behaviours were the following: (1) suicidal behaviour; (2) substance abuse; (3) road related behaviour; (4) interpersonal violence; and (5) sexual behaviour.

In order to check over-reporting risk-taking behaviour, the respondents were asked if they had ever used a fictitious drug (Lovar-25), and, if they had, to provide some details of frequency of use. If a respondent answered affirmatively to that item, that questionnaire was excluded from the study. There were no items in the questionnaire to assess under-reporting. However, great care was taken to ensure confidentiality and anonymity. Furthermore, previous studies have indicated that adolescent self-reports are, in most cases, reliable and valid (Farrington, 1973; Murray and Perry, 1987; Needle *et al*, 1983). Further details regarding the questionnaire have been published elsewhere (Flisher *et al*, 1993a).

Study population

The study population was defined as all living teenage children of the household heads (or their spouses) in the community. A teenager was defined as a person aged 13 to 19 years.

It is not possible to report the precise location of the community owing to a restriction by the education authorities. However, it is situated on the Cape Flats in Cape Town; under the Group Areas Act of 1950, it was designated for occupation by those classified as "coloured" under the Population Registration Act of 1950. According to the most recent available data, the total population of the community is 15 802, of whom 34.0% are aged 0 to 14 years (Central Statistical Services, 1991). Gross population density is 64.86 people/hectare (Central Statistical Services, 1991). The dwelling density is 1.54 per habitable room, which is one of the highest in Cape Town (Patel, 1984). Furthermore, the average personal income and the average level of education are low compared to other areas in Cape Town (Patel, 1984).

All the plots in the community were stratified according to housing type since there are economic differences between those living in different types of housing. The four strata were: (1) council housing; (2) private housing; (3) council apartments; and (4) private apartments. A total of 1000 plots were selected using aerial photographs and town planners' maps. Within each stratum, random selection produced the number of plots proportionate to the number of plots in that stratum in the community as a whole. If a plot contained a house, no further sampling took place. If a plot contained an apartment block, in a second stage of sampling one floor was selected at random and all household heads (or their spouses) of all families living in all the apartments on that floor were interviewed.

A dropout was defined as a teenager if the household head (or the spouse) indicated that he or she: (1) had not attended school at all during the year that the interview took place; and (2) had not received a senior certificate (which is the diploma obtained on successfully completing high school); and (3) did not require special schooling.

The school-attending sample (with which the risk -taking behaviour of the dropouts was compared) comprised all the students attending a high school situated in the community. All the dropouts had attended either this school or other very similar schools. It was decided to compare the responses of the dropouts with this one school and not with all 16 schools sampled in the previous study to attempt to control for possible confounding variables such as social class, home language, and population group.

Procedure

Before commencing with the interview, the field workers requested to see a receipt for the municipal rates to verify that they were at the selected plot. This was necessary as the aerial photographs and the town planners' maps were not always clear.

As mentioned above, fieldworkers interviewed the household heads to obtain information about their teenage children. In many cases, it was necessary before being able to interview the household head (or the spouse) to return to the dwelling on several occasions as they were not at home,

did not answer the knock on the door even when they were in fact at home, or said that the time was not convenient.

They asked the permission of the household heads and the dropouts themselves for the questionnaire dealing with risk-taking behaviour to be completed. The fieldworkers left the questionnaires to be completed by the teenagers in private, and they were collected later after they had been placed in a sealed envelope by the respondent. Again, in many cases several visits were necessary before the completed questionnaire was provided. It was emphasised that the responses to the questionnaire would remain anonymous.

In several cases, it emerged during the visits that somebody living in the dwelling was suffering from some medical, social, or psychological problem for which they were not receiving the necessary assistance. In these cases, referrals were made to the appropriate facilities.

The field work was completed by two fieldworkers, one of whom was a registered nurse, working full-time for an eight month period commencing in July 1991.

The students who had completed the questionnaire at school had done so in a normal school period under conditions approximating those of examinations. The students were supervised by members of the research team; there were no teachers present while the students were completing the questionnaire.

Analysis

The responses for each respondent were weighted by the corresponding probability of the household, or plot, being selected for the sample. Because of the second stage of sampling, respondents in apartments were assigned lower probabilities than those in houses.

The prevalences of various forms of risk-taking behaviour of the dropouts were expressed as percentages. These prevalences are estimates of the true prevalences, which are unknown. An indication of how close a calculated prevalence is to the true prevalence is given by the confidence interval. The 95% confidence interval is such that there is a probability of 0.95 that the interval includes the true prevalence.

The responses of the dropouts were compared to those of the students attending school using *odds ratios*. The method of logistic regression was used to obtain the odds ratios adjusted for age. The odds ratio is a measure of association which approximates how much more likely it is for an outcome to be present among those at school than with those who are dropouts. An odds ratio is declared significant if the ratio is significantly different from a value of one. The test procedure was carried out in the logistic regression analysis, where the natural logarithm of an odds ratio is tested against a value of 0 using Student's t-test.

As with the prevalence of a form of risk-taking behaviour, the odds ratio calculated from the data is an estimate of the true odds ratio. The 95% confidence interval

is such that there is a probability of 0.95 that the interval includes the true odds ratio.

Age was introduced as a co-variate since there were differences in the age distribution between the dropouts and those still attending school.

RESULTS

There were 548 living teenage children of the household heads or their spouses of the 1000 plots that were selected. The numbers of children from each stratum are as follows: (1) council housing - 161 (29.4%); (2) private housing - 266 (48.5%); (3) council apartments - 103 (18.8%); (4) private apartments - 5 (0.9%); (5) no stratum coded - 13 (2.4%).

Of these 548 teenagers, 87 (15.9%) were dropouts as defined above. The numbers of males and females who were dropouts were 37 (13.6%) and 50 (18.2%) respectively; this difference is not statistically significant (Fisher's Exact Test; $p = 0.161$). The numbers of dropouts from each stratum are as follows: (1) council housing - 35 (40.2%); (2) private housing - 27 (31.0%); (3) council apartments - 24 (27.6%); (4) private apartments - 0; and (5) no stratum coded - 1 (1.1%).

The mean age of the dropouts was 17.7 (standard deviation = 1.2) years. None of the dropouts were married; 9 (10.3%) had children of their own; and 81 (93.1%) still lived in their parents' dwellings.

The numbers of teenagers who had left school at each age were as follows: 15 years or less - 31 (35.6%); 16 years - 30

(34.5%); 17 years - 13 (14.9%); and 18 years - 11 (12.6%) (there were 2 missing responses). The highest standards achieved at school were as follows: standard 5 (that is, seven years of schooling) or less - 34 adolescents (39.1%); standard 6 - 20 (23.0%); standard 7 - 19 (21.8%); standard 8 - 9 (10.3%); and standard 9 - 5 (5.7%).

Reasons given for leaving school given by more than five teenagers were as follows: didn't feel like attending school/refused to attend school/played truant - 41 adolescents (47.1%); poor academic progress - 22 (25.3%); and economic reasons - 16 (18.4%). Only 2 students (2.3% of all the dropouts) had dropped out of school due to pregnancy.

The employment status of the dropouts were reported as follows: employed - 48 adolescents (55.2%); unemployed but attempting to find employment - 13 (14.9%); and unemployed and not attempting to find employment - 22 (25.3%) (there were 4 missing responses).

Of the 87 dropouts, data involving risk-taking behaviour are provided for 68 teenagers. Data are not provided for the remainder for the following reasons: (1) consent was not obtained (12 teenagers); (2) the questionnaire had been completed when the teenager was still attending school - these were excluded since comparison with the teenagers still attending school would not have been valid (4 teenagers); and (3) the age of the teenager was 15 years or younger - these were excluded since there were too few adolescents for comparison with those still at school (3 teenagers).

It was not necessary to exclude any of the questionnaires involving risk-taking behaviour since none of the dropouts

indicated that they had used the fictitious drug. The prevalences of the risk-taking behaviours are presented for each gender separately and for the sample as a whole in Table 1.

Insert Table 1 about here

There were 332 students aged 15 years or older in the school-going sample; of these, 173 (52.1%) were boys and 159 (47.9%) were girls. The odds ratios for the variables included in Table 1 for those who still attend school relative to the dropouts are presented in Table 2.

Insert Table 2 about here

For the items involving suicidal behaviour, the only statistically significant finding was the odds ratio of 3.52 for females still at school for seriously thinking about self harm in a way which might result in death. With the exception of males with respect to this variable, all the other odds ratios for the items dealing with suicidal behaviour were greater than 1. There is thus a trend for those still attending school to be more likely to engage in suicidal behaviour.

The only statistically significant odds ratio for the variables involving substance abuse was the value of 0.52 obtained for smoking at least one cigarette per day for males and females combined. The odds ratios for this variable for males and females separately were less than 1. Furthermore, for males and females separately and for both genders together, the odds ratios for smoking cannabis and methaqualone together and for all five items involving alcohol use were less than 1. The trend is thus for those who attend school to be *less* likely to use (or abuse) these substances than those who no longer do so. The finding for females with respect to lifetime prevalence of cannabis use is also consistent with this trend.

There were no statistically significant odds ratios for the items involving road related behaviour and the trends in this regard are not as obvious as for suicidal behaviour and substance abuse. There may however be a trend for those who are still attending school to be more likely to engage in risky road-related behaviour. Exceptions to this trend are found for items involving motor-bike riding, travelling in or driving vehicles that are not road-worthy, and driving without a licence.

There were no statistically significant odds ratios for violent behaviour and no obvious trends were discernable.

The odds ratio for females for ever having had sexual intercourse (0.31) was statistically significant. Girls who are still at school are thus less likely to have had sexual intercourse than the dropouts. This did not apply to the boys. Although there were no other statistically significant

odds ratios, the trends were for those at school to be more likely not to know their partners for more than seven days and more likely to use contraception.

DISCUSSION

It is difficult to compare the dropout rate of 15.9% with those reported in previous studies owing to differences in the way in which "dropout" is defined. The most comparable definition is the proportion of a given age cohort that is not enrolled in school and has not completed high school (Rumberger, 1987). Using this method, the dropout rates in the United States of America were 6.8% for those aged 16 and 17 years and 15.2% for those aged 18 and 19 years. Since the dropout rate in the present study applies to teenagers of all ages, it may be that the dropout rate in this community is higher than that reported in the United States of America.

It is a cause for concern that more than a third of the dropouts had left school at the age of 15 years or less and almost two thirds had left school having achieved a highest qualification of standard six or less. Many of the dropouts would thus be very poorly equipped to compete on the labour market. Furthermore, it is unlikely that they would complete their schooling at a later stage. Intervention thus needs to be targeted at school students while they are still in their primary school.

The finding in the U.S.A. (Rumberger, 1987) and Botswana (Duncan, 1988) that females are more likely than males to drop out was not confirmed in this study. In the case of Botswana,

it was intimated that the reason for this discrepancy is that girls are more exposed to the possibility of leaving school through pregnancy (Duncan, 1988). However, in the present study only two of the girls had left school because of pregnancy; this may account for the difference between this population and those of the USA and Botswana (Duncan, 1988; Rumberger, 1987).

Despite the fact that only two students left school because of pregnancy, 10.3% of the dropouts reported having children of their own. This discrepancy could be accounted for by the following factors: (1) the children were conceived after having dropped out of school; (2) although they were pregnant at the time of dropping out of school, they either did not know it or it was not the factor that caused them to leave school; and (3) the validity of the data may be poor due to respondents being reluctant to admit to the researches that pregnancy was the cause of the dropping out. Further investigation is required to illuminate this issue.

The other reasons given for dropping out of school are also prominent in previous research (Duncan, 1988; Rumberger, 1987;). It is however necessary to bear in mind that the reasons offered for having left school prematurely are frequently symptoms of other underlying causal factors (Cairns et al, 1989; Rumberger, 1987). For example, emotional factors were not reported, yet it is possible that they accounted for an unwillingness to attend school or poor academic progress in some cases (Klerman et al, 1987). Furthermore, oppressive social policies and inequitable state expenditure in South Africa have contributed to the area being characterised by a

poor standard of living, overcrowding, a high crime rate, high levels of gang activity, and relatively inferior educational facilities. These factors may thus also have served as underlying causal factors. These underlying causal factors would be more likely to emerge if there had been the opportunity for exploration of the responses in the context of a qualitative methodology. In the present study, the questions were direct and closed, resulting in responses that did not necessarily convey the full complexity of the situation. A further threat to the validity of the responses is that the information was obtained from adults that were responsible for the adolescent; it is possible that different responses would have been obtained if the adolescents themselves had been interviewed.

It would appear that a substantial proportion of the dropouts are engaging in various forms of risk-taking behaviour. This is certainly a cause for concern in its own right. However, it is necessary to compare the behaviour of school dropouts with that of those who are still attending school to put these data into perspective.

There are very few reports in which the prevalence of risk-taking behaviour of school dropouts is compared to that of adolescents still attending school. All the reports that could be unearthed concern youth in the United States of America; furthermore, with the exception of the work of Chavez *et al* (1989), they confine their attention to substance abuse. The findings that the dropouts tended to have higher rates of cigarette and alcohol use are consistent with these studies (Chavez *et al*, 1989; Eggert *et al*, 1990; Kandell, 1975;

McKirnan and Johnson, 1986; Pirie *et al*, 1988), and indicate that prevention of substance abuse by school dropouts should be prioritised. Conversely, the finding of Chavez *et al* (1989) that dropouts tended to be more likely to perpetrate acts of violence was not confirmed by the present study.

Adolescents still attending school being more likely than dropouts to engage in suicidal behaviour may be accounted for by these students being under more pressure since they are exposed to academic demands (Flisher *et al*, 1993b).

Females who are still at school are less likely to have had sexual intercourse than the dropouts. As mentioned above, it is possible that a greater proportion of the girls were pregnant on leaving school than was indicated by the questionnaire responses. It is thus possible that some of the girls who had had sexual intercourse while still at school dropped out as a consequence of their sexual activity. This could contribute to the finding that a lower proportion of girls still attending school had had sexual intercourse compared to those who had left school prematurely.

The comparisons between those who still attend school and the dropouts should be viewed with some caution owing to the following factors.

1. Different methodologies were employed in obtaining the prevalences of risk-taking behaviour in the two samples; those at school completed the questionnaire under conditions approximating those of examinations while the dropouts completed the questionnaire at home before giving it to the field workers in a sealed envelope.

Notwithstanding the fact that in the latter case, the teenager had the opportunity of completing the questionnaire in private, there may have been concerns about anonymity which could have affected the validity of the results (Kandell, 1975).

2. There were 12 teenagers who refused to complete the questionnaire involving risk-taking behaviour. It is possible that this may have introduced a source of bias.
3. The sample size was relatively small. The confidence intervals are thus relatively large (especially for the odds ratios given separately for each gender), and the statistical power to produce significant results reduced. It is probable that significant results would have been obtained for many items if the sample size had been larger (for example, for the items dealing with alcohol use). It is however extremely difficult to obtain large samples when recruiting school dropouts through door-to-door canvassing.
4. More than half of the dropouts are employed; they have thus not dropped out of society at large. It is possible that the differences between the dropouts and the school attenders would have been more pronounced if those who are employed had been excluded from the dropout sample.

Furthermore, both the comparisons in risk-taking behaviour with the school-attending sample and the other

results reported above may not be generalisable to all South African school dropouts. As intimated above, the community in which the project was carried out is relatively economically deprived and is occupied predominantly by those classified as "coloured" under the Population Registration Act of 1950. It is probable that the situation is different in other communities. For example, in an affluent white community it is possible that family and individual factors would play a greater role in determining reasons for dropping out than economic factors (Rumberger, 1987).

Despite these methodological limitations, this study has contributed by being the first in South Africa in which the characteristics and risk-taking behaviour of high-school dropouts have been investigated. Future studies need to employ larger and more representative samples, make use of qualitative (in addition to quantitative) methodology, employ longitudinal and case-control designs, and evaluate (in the context of action research) any intervention programmes that may be introduced. These programmes need to address not only dropping out but also the interlinked phenomenon of risk-taking behaviour.

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Table 1. Prevalences (with 95% confidence intervals) of various forms of risk-taking behaviour of the dropouts, by gender and for the total sample, expressed as percentages

	Males (N=28)	Females (N=40)	Total (N=68)
<i>Suicidal behaviour</i>			
Seriously thinking about self harm in a way which might result in death ¹	13.5 (2.0-24.9)	11.7 (2.3-21.0)	12.4 (5.2-19.6)
Telling anyone of an intention of commit suicide ¹	9.0 (0.0-18.6)	12.6 (3.0-22.3)	11.2 (4.3-18.1)
Actually trying to commit suicide ¹	4.5 (0.0-11.5)	8.7 (0.5-17.0)	7.1 (1.5-12.7)
<i>Substance abuse</i>			
Smoking at least one cigarette per day	34.4 (18.4-50.4)	39.8 (25.6-54.1)	37.7 (27.1-48.3)
Ever having smoked cannabis on its own	4.5 (0.0-11.5)	8.7 (0.5-17.0)	7.1 (1.5-12.7)
Ever having smoked cannabis and Mandrax (methaqualone) together	4.5 (0.0-11.5)	2.9 (0.0-7.8)	3.5 (0.0-7.6)
Ever having sniffed solvents	0.0	3.6 (0.0-9.1)	2.2 (0.0-5.4)
Ever having used injectable drugs	0.0	0.0	0.0
Ever having used alcohol	59.8 (43.3-76.3)	42.0 (27.7-56.4)	49.0 (38.1-59.9)
Used alcohol at least once in the previous 7 days	29.9 (14.5-45.3)	16.3 (5.5-27.0)	21.6 (12.6-30.6)
Used alcohol on 4 or more occasions in the previous 7 days	9.0 (0.0-18.6)	0.0	3.5 (0.0-7.6)

(Table 1 continued)

	Males	Females	Total
Had 5 or more drinks at least once in the previous 14 days	34.4 (18.4-50.4)	16.5 (5.7-27.3)	23.6 (14.3-32.8)
Had 5 or more drinks on 4 or more occasions in the previous 14 days	13.5 (3.8-23.1)	2.9 (0.0-7.8)	7.1 (1.5-12.7)
<i>Road-related behaviour</i>			
Riding on a motor-bike as a passenger or a driver ¹	29.5 (14.2-44.9)	12.4 (2.8-22.0)	19.1 (10.5-27.7)
Riding on a motor-bike without a helmet ²	60.8 (30.5-91.0)	47.1 (5.8-88.3)	55.4 (30.6-80.2)
Being involved in an accident while travelling in a motor vehicle (excluding motor bikes) ¹	10.5 (0.2-20.8)	8.7 (0.5-17.0)	9.4 (3.0-15.8)
Being injured by a motor-vehicle, motor-bike or bicycle while walking or standing ¹	0.0	2.9 (0.0-7.8)	1.8 (0.0-4.6)
Not wearing a seat belt on the last occasion travelling in the front passenger seat of a motor vehicle ³	21.3 (6.7-35.9)	30.4 (15.6-45.2)	26.6 (16.1-37.1)
Travelling in a motor vehicle knowing or strongly suspecting that the vehicle was overcrowded ⁴	39.3 (21.7-57.0)	42.3 (27.3-57.3)	41.2 (29.8-52.5)

(Table 1 continued)

	Males	Females	Total
Travelling in a motor vehicle knowing or strongly suspecting that the vehicle was not road-worthy or not safe to drive ⁴	18.6 (4.5-32.7)	30.3 (16.3-44.3)	25.9 (15.7-36.0)
Travelling in a motor vehicle knowing or strongly suspecting that the driver did not have a licence ⁴	24.2 (8.7-39.7)	30.3 (16.3-44.3)	28.0 (17.6-38.4)
Travelling in a motor vehicle knowing or strongly suspecting that the driver was affected by alcohol or cannabis ⁴	12.1 (0.3-23.9)	8.8 (0.2-17.4)	10.0 (3.1-17.0)
Driving a vehicle that was overcrowded ⁵	0.0	0.0	0.0
Driving a vehicle that was not roadworthy ⁵	25.0 (0.0-59.4)	23.5 (0.0-58.6)	24.2 (0.0-48.8)
Driving a vehicle without a licence ⁵	25.0 (0.0-59.4)	52.9 (11.7-94.2)	39.4 (11.4-67.4)
Driving a vehicle while affected by alcohol or cannabis ⁵	0.0	0.0	0.0
<i>Violent behaviour</i>			
Being physically hurt by an adult at home ¹	13.5 (2.0-24.9)	0.0	5.3 (0.4-10.2)
Being physically injured by anybody outside of home ¹	22.4 (8.4-36.5)	7.5 (0.0-15.2)	13.4 (6.0-20.8)
Physically injuring anybody outside of home or school ¹	18.0 (5.0-30.9)	2.9 (0.0-7.8)	8.8 (2.6-15.0)

	Males	Females	Total
Causing serious damage to property outside of home or school ¹	4.5 (0.0-11.5)	0.0	1.8 (0.0-4.6)
Going out at night beyond the neighbourhood without knowing how to get home ⁶	26.9 (12.0-41.9)	14.8 (4.5-25.1)	19.6 (10.9-28.3)
Going out at night beyond the neighbourhood and walking home alone ⁶	39.6 (23.3-56.1)	9.3 (0.9-17.8)	21.3 (12.3-30.2)
Going out at night beyond the neighbourhood and hitchhiking home ⁶	4.5 (0.0-11.5)	2.9 (0.0-7.8)	3.5 (0.0-7.6)
<i>Sexual behaviour</i>			
Ever having had heterosexual vaginal intercourse	32.9 (17.1-48.7)	35.2 (21.3-49.1)	34.3 (23.9-44.7)
Not knowing the partner for more than 7 days ⁷	31.8 (4.5-59.1)	0.0	12.0 (0.0-24.1)
Not doing anything to prevent pregnancy ⁷	45.5 (16.2-74.7)	50.3 (25.9-74.8)	48.5 (29.9-67.1)

1. refers to the previous 12 month period
2. refers to the previous 12 month period for those who had ridden on a motorbike or motorscooter as a passenger or a driver
3. expressed in terms of those who had travelled in the front passenger seat of a motor vehicle in the previous 12 months and who had a seatbelt available to them on the last occasion that they travelled in the front passenger seat of a motor vehicle
4. refers to the previous 12 month period for those who had travelled in a motor vehicle in the previous 12 months
5. refers to the previous 12 month period for those who have ever driven a motor vehicle (excluding a motor bike) on a public road
6. refers to the previous 4 week period
7. refers to the last occasion that intercourse took place for those who had had sexual intercourse

Table 2. Odds ratios (with 95% confidence intervals) for various forms of risk-taking behaviour for those who still attend school relative to the dropouts

	Males	Females	Total
<i>Suicidal behaviour</i>			
Seriously thinking about self harm in a way which might result in death ¹	0.94 (0.24-3.68)	3.52 (1.10-11.29)	1.82 (0.76-4.35)
Telling anyone of an intention of commit suicide ¹	1.12 (0.23-5.39)	1.75 (0.59-5.14)	1.28 (0.53-3.09)
Actually trying to commit suicide ¹	1.20 (0.13-11.14)	2.14 (0.55-8.27)	1.47 (0.47-4.56)
<i>Substance abuse</i>			
Smoking at least one cigarette per day	0.63 (0.25-1.58)	0.45 (0.20-1.02)	0.52 (0.28-0.94)
Ever having smoked cannabis on its own	4.49 (0.55-36.99)	0.48 (0.09-2.58)	1.73 (0.54-5.51)
Ever having smoked cannabis and Mandrax (methaqualone) together	0.93 (0.10-8.32)	0.33 (0.01-16.24)	0.88 (0.16-4.77)
Ever having sniffed solvents	8	2.11 (0.37-12.19)	3.63 (0.80-16.43)
Ever having used injectable drugs	8	8	8
Ever having used alcohol	0.72 (0.30-1.75)	0.69 (0.31-1.50)	0.82 (0.47-1.45)
Used alcohol at least once in the previous 7 days	0.61 (0.20-1.88)	0.91 (0.26-3.13)	0.77 (0.34-1.73)
Used alcohol on 4 or more occasions in the previous 7 days	0.38 (0.04-3.27)	8	0.62 (0.08-4.98)

(Table 2 continued)

	Males	Females	Total
Had 5 or more drinks at least once in the previous 14 days	0.43 (0.14-1.34)	0.50 (0.14-1.76)	0.52 (0.23-1.18)
Had 5 or more drunks on 4 or more occasions in the previous 14 days	0.55 (0.12-2.48)	0.47 (0.04-5.78)	0.69 (0.19-2.48)
<i>Road-related behaviour</i>			
Riding on a motor-bike as a passenger or a driver ¹	0.76 (0.29-1.95)	1.67 (0.55-5.03)	1.18 (0.59-2.38)
Riding on a motor-bike without a helmet ²	0.86 (0.16-4.71)	1.06 (0.14-7.88)	0.95 (0.27-3.41)
Being involved in an accident while travelling in a motor vehicle (excluding motor bikes) ¹	1.37 (0.32-5.78)	1.85 (0.44-7.70)	1.61 (0.59-4.43)
Being injured by a motor-vehicle, motor-bike or bicycle while walking or standing ¹	⁸	4.13 (0.45-37.61)	4.41 (0.55-35.06)
Not wearing a seat belt on the last occasion travelling in the front passenger seat of a motor vehicle ³	4.54 (1.25-16.39)	1.46 (0.50-4.27)	2.46 (1.11-5.46)
Travelling in a motor vehicle knowing or strongly suspecting that the vehicle was overcrowded ⁴	2.79 (1.06-7.32)	1.25 (0.54-2.91)	1.95 (1.04-3.64)

(Table 2 continued)

	Males	Females	Total
Travelling in a motor vehicle knowing or strongly suspecting that the vehicle was not road-worthy or not safe to drive ⁴	1.86 (0.61-5.69)	0.63 (0.25-1.60)	1.06 (0.53-2.11)
Travelling in a motor vehicle knowing or strongly suspecting that the driver did not have a licence ⁴	2.45 (0.86-6.96)	1.32 (0.53-3.30)	1.86 (0.95-3.65)
Travelling in a motor vehicle knowing or strongly suspecting that the driver was affected by alcohol or cannabis ⁴	1.52 (0.38-6.08)	1.43 (0.33-6.26)	1.63 (0.60-4.42)
Driving a vehicle that was overcrowded ⁵	8	8	8
Driving a vehicle that was not roadworthy ⁵	0.52 (0.04-6.04)	8	0.45 (0.08-2.61)
Driving a vehicle without a licence ⁵	7.05 (0.64-77.52)	0.31 (0.04-2.53)	2.11 (0.51-8.76)
Driving a vehicle while affected by alcohol or cannabis ⁵	8	8	8
<i>Violent behaviour</i>			
Being physically hurt by an adult at home ¹	0.57 (0.14-2.29)	8	1.84 (0.52-6.50)
Being physically injured by anybody outside of home or school ¹	0.80 (0.26-2.42)	0.77 (0.22-2.74)	0.90 (0.40-2.06)
Physically injuring anybody outside of home or school ¹	1.43 (0.45-4.58)	1.77 (0.20-15.93)	1.93 (0.71-5.23)

(Table 2 continued)

	Males	Females	Total
Causing serious damage to property outside of home or school ¹	1.47 (0.18-12.30)	8	2.49 (0.31-19.98)
Going out at night beyond the neighbourhood without knowing how to get home ⁶	0.86 (0.30-2.43)	0.75 (0.25-2.30)	0.90 (0.43-1.90)
Going out at night beyond the neighbourhood and walking home alone ⁶	0.59 (0.24-1.45)	2.73 (0.78-9.50)	1.23 (0.63-2.41)
Going out at night beyond the neighbourhood and hitchhiking home ⁶	2.79 (0.34-23.17)	0.42 (0.04-4.36)	2.08 (0.44-9.77)
<i>Sexual behaviour</i>			
Ever having had heterosexual vaginal intercourse	1.98 (0.77-5.09)	0.31 (0.12-0.82)	1.03 (0.55-1.94)
Not knowing the partner for more than 7 days ⁷	2.20 (0.20-24.39)	8	5.34 (0.61-47.62)
Not doing anything to prevent pregnancy ⁷	0.74 (0.12-4.61)	0.65 (0.12-3.64)	0.43 (0.14-1.32)

1-7. see footnotes for Table 1.

8. none of the adolescents in the community based sample answered affirmatively to this item.

Paper 3

Youth attending Cape Peninsula day hospitals. Sexual behaviour and missed opportunities for contraception counselling.

Youth attending Cape Peninsula day hospitals

Sexual behaviour and missed opportunities for contraception counselling

A. J. FLISHER, M. M. ROBERTS, R. J. BLIGNAUT

Abstract

Questionnaires were completed by a sample of youth (aged 15 - 24 years) attending day hospitals in the Cape Peninsula. Of the total sample of 225, 73,3% indicated that they had experienced sexual intercourse; of these, 27,3% had had 2 or more partners in the previous year, and on their last coital episode 91,0% had known their partner for more than 7 days and 52,8% had used some form of contraception. The criteria of a strict definition of missed opportunity for contraception intervention were fulfilled by 7,6% of the total sample, while 43,6% of those who had experienced sexual intercourse and 43,9% of those who had not did not receive contraception intervention but would have liked to have done so. Those who had had more than one partner in the previous year were more likely to have satisfied the strict definition of missed opportunity, while of those who had not had sexual intercourse, younger respondents and students were more likely not to have received contraception intervention despite wanting such intervention. It is concluded that all youth attending day hospitals should routinely be offered contraception counselling and that the issue of sexually transmitted diseases should be addressed simultaneously.

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One of the major challenges in the field of public health internationally' and in South Africa^{1*} is that posed by the high incidence of unwanted pregnancies among young people. There is a higher incidence of obstetric difficulties in these pregnancies than in other primigravid pregnancies,^{7*} and there are frequently adverse psychological, social and economic sequelae⁸ that are not necessarily limited to the mother and the child¹⁰ but can also involve other family or community members.¹¹ Young people themselves are concerned by this; 65% of black township youth in a recent survey¹² named teenage pregnancy as their most serious problem.

Nash concluded her recent local review of teenage pregnancy¹³ by stating: 'Improved social standards, sex education and contraceptive counselling, imaginative health and education facilities and less restrictive abortion laws in most countries have led to falling birth rates and a higher percentage of wanted children.' Thus, the provision of adequate contraceptive services is only one facet of an appropriate response to this problem, albeit a crucial one from the point of view of health professionals. Furthermore, there is an overlap between behaviour having a contraceptive effect and behaviour reducing the incidence of sexually transmitted diseases (e.g. HIV infection); particularly important in this regard is the use of condoms.¹⁴ However, many of the young people who become pregnant do in fact have access to suitable facilities but do not utilise them. Obviously, the reasons for this are complex, but include the observations that: (i) the lifestyles of young people involve experimentation and rebellion and therefore a relatively large degree of risk-taking behaviour (although this may decrease with age);⁸ and (ii) young people may not refer themselves for contraceptive intervention owing to unresolved emotional issues regarding sexuality. *It is thus of great importance that no opportunity is missed at all contacts with health care facilities, including curative facilities, to provide contraceptive services.* The necessity of exploiting all such contacts is underlined by the fact that youth tend to be relatively healthy and thus do not often attend medical services.¹⁵ The aims of this

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study were therefore, for a sample of youth attending day hospitals in the Cape Peninsula: (i) to describe certain demographic features and selected aspects of sexual behaviour; (ii) to document the proportion of missed opportunities for contraception counselling; and (iii) to help planners and carers improve contraceptive services for youth by relating (ii) to (i).

Methods

The target population was defined as all youth (defined according to the World Health Organisation (WHO) criterion, viz. all people between the ages of 15 and 24¹¹) attending day hospitals in the Cape Peninsula. The sampling unit was the individual day hospital. Of the 26 day hospitals, 10 were excluded because less than 20 youth per day attend them. Also, the day hospital at which one of the investigators (M.R.) is employed was excluded to prevent bias. Of the remaining day hospitals, 10 fall under the House of Representatives (HoR) and 5 under the Cape Provincial Administration (CPA). Four day hospitals were randomly selected from those falling under the HoR and 2 were randomly selected from those falling under the CPA. On leaving the day-hospital premises, all youth (i.e. patients and escorts) attending that facility during one day were asked to complete a questionnaire eliciting the following information: (i) demographic data; (ii) the presenting complaints; (iii) whether they had received any information regarding contraception at that visit and whether they would have liked to have received such information; and (iv) whether they had had sexual intercourse and, if they had, selected aspects of sexual practice, contraceptive behaviour, and whether they wished a pregnancy to result from the last coital episode or were pregnant at that time. The questionnaire was available in Afrikaans, English and Xhosa and had been subjected to pilot studies. The responses to the questionnaire were anonymous. A slip of paper with the diagnosis or differential diagnosis was completed by the staff member attending the patient and then given to the fieldworker by the youth. If a respondent indicated that advice regarding contraception would be welcome, it was either provided by the fieldworkers (at least one of whom at each venue was a professional nurse) or a referral letter to the nearest family planning clinic was provided; it was not possible to refer the patient straight back into the day hospital as this could bias the results. Permission was obtained from the medical superintendents responsible for the day hospitals and from the doctor in charge of each participating day hospital; to prevent bias, the latter were requested not to mention the aims of the project to the staff of the day hospitals.

The rates of missed opportunities were calculated according to three sets of criteria (Table I).

It should be noted that the criteria comprising definition 1 are extremely strict and would give a low estimate of the rate of missed opportunities. Conversely, the criteria comprising definition 2 are more loose and would thus give a higher estimate of the rate.

Selected determinants for missed opportunity were investigated using a stepwise logistic multiple regression model.¹² The dependent variable was whether an opportunity was missed or not according to each of the definitions of missed opportunity, and the independent variables were the following: (i) age; (ii) sex; (iii) hospital department (CPA/HoR); (iv) whether the respondent had children or not; (v) marital status; (vi) level of education (Standard 6 or less/more than Standard 6); (vii) occupation; (viii) number of sexual partners in the past year (1 partner/more than 1 partner); (ix) whether the respondent had known the partner for more than 7 days; (x) length of time since the last coital episode; and (xi) whether the respondent was a patient or an escort. For definition 1, none of the variables used in the construction of the definition were included.

Results

Three people refused to participate after the aim of the study was explained, and one questionnaire had to be discarded because inconsistent responses were provided. Of the 225 people included in the study, 73,3% were female; 15,1% were married; 58,7% had no children; 43,6% had a highest educational qualification of Standard 6 or less; 23,8% were unemployed; and 28,9% were attending educational institutions. The mean age of the 222 youth who stated their age was 20,1 years (SD 2,6 years). The day hospitals falling under the HoR and CPA accounted for 76,0% and 24,0% of the respondents respectively. No patients came to the day hospital to receive contraceptive intervention. Eight patients were diagnosed as being pregnant.

Advice, information or help about family planning or preventing pregnancy was given to 23,6% of the respondents at that visit to the day hospital, while 63,6% indicated that they would have liked to have received such intervention. Of the 165 youth who had experienced sexual intercourse, 4,2% reported having had no sexual partners during the previous 12 months; 63,0% had had 1 partner, 15,8% 2, 9,7% 3 or more. The length of time since the last episode of sexual intercourse was less than 1 week for 13,3% of the respondents, less than 1 month but more than 1 week for 35,2%, and more than 1 month for 38,2%. Of those who answered the question regarding the last occasion that intercourse had taken place, 91,0% reported that they had known their partner for more than 7 days, 20,0% indicated that they wished a pregnancy to result from that episode of intercourse, 7,8% said that they knew that they or their partner was pregnant on that occasion, and 52,8% said that they had done or used something to prevent pregnancy. The most common method of contraception was injectable steroids, which had been administered to 69 women

TABLE I
Definitions of missed opportunity

Definition 1: A missed opportunity is defined to exist for a particular respondent if all the following conditions are fulfilled:

- S/he has had sexual intercourse
- S/he did not use any contraception on the last occasion that intercourse took place and has not subsequently started using contraception
- S/he did not wish a pregnancy to result from the last coital episode
- She or (for males) his partner was not pregnant on the last occasion that intercourse took place and has not subsequently become pregnant;
- S/he did not receive any intervention regarding contraception during that day-hospital visit and did not come to the day hospital for this purpose
- S/he indicated that s/he would have liked to have received intervention regarding contraception during that day-hospital visit.

Definition 2: A missed opportunity is defined to exist for a particular respondent if all the following conditions are fulfilled:

Definition 2 (a):

- S/he has had sexual intercourse
- S/he did not receive any intervention regarding contraception during that day-hospital visit
- S/he indicated that s/he would have liked to have received intervention regarding contraception during that day-hospital visit.

Definition 2 (b):

- S/he has not had sexual intercourse
- S/he did not receive any intervention regarding contraception during that day-hospital visit
- S/he indicated that s/he would have liked to have received intervention regarding contraception during that visit to the day-hospital

(43,1% of those answering the question); oral contraceptives were used by 8 women (5,0%); coitus interruptus was used by 6 respondents (3,8%); and condoms were used by 5 respondents (3,1%). No respondents reported using other methods. Of those who did not do or use anything to prevent pregnancy on the last coital episode, 59 (42,8%) reported that they were using one of the methods mentioned above at the time of the survey.

According to definition 1, the strict definition of missed opportunity (Table 1), there was a missed opportunity for 17 respondents (7,6% of the total sample). According to definition 2, there was a missed opportunity for 72 (43,6%) of those who reported having had sexual intercourse and 25 (43,9%) of those who denied this. There were no significant differences for any of the definitions of missed opportunity between those who were seen by the doctor in charge of the day hospital and those who were seen by other personnel.

For definition 1, the only variable qualifying for inclusion in the stepwise logistic multiple regression model at the 5% significance level was the number of sexual partners in the past year ($\chi^2 = 10,25$; $P = 0,001$), with those having more than one partner having a higher rate of missed opportunity ($R^2 = 10,6\%$). For definition 2 (a), no variables qualified for inclusion. For definition 2 (b), occupation ($\chi^2 = 10,97$; $P = 0,001$) and age ($\chi^2 = 4,38$; $P = 0,0363$) qualified for inclusion. R^2 for occupation alone was 9,2% and for occupation and age together was 11,5%. Youth who were studying at educational institutions had a higher rate of missed opportunity than those who were not studying. Missed opportunities were more likely among younger youth than older youth (Mann-Whitney test; $\chi^2 = 18,19$; $P = 0,0001$).

Discussion

Some aspects of the sexual behaviour described in this study are cause for concern, viz the findings that: (i) more than a quarter of the sample had had 2 or more sexual partners in the preceding year; (ii) about one-tenth of the sample had not known their last sex partner for more than 7 days; and (iii) only 3,1% had used a condom on the last occasion that they had intercourse. The implication is that any intervention regarding contraception should simultaneously address the issue of sexually transmitted diseases (especially HIV infection).

About 43% of the sample did not receive any intervention regarding contraception at that visit to the day hospital and yet would have liked to have received such intervention; this applies to both those who had had coital experience and those who had not. For those who had not had coital experience, there are more likely to be missed opportunities for those attending educational institutions and for younger youth. These groups may be perceived to be least in need of contraception counselling, and their needs may therefore be overlooked. Furthermore, 7,6% of the entire sample were not provided with any assistance regarding contraception when the data indicate not only that they were receptive to this assistance but that there was a considerable risk of an unwanted pregnancy resulting from their sexual activities: this risk is increased by the young people making up this proportion being significantly more likely to have had more than 1 partner during the preceding year than those who did not make up this proportion. The finding that a relatively small amount of variance was accounted for by the variables included in the model suggests that the targeting of contraceptive services to particular categories of youth is not indicated.

That there is this extent of missed opportunities is particularly noteworthy in the light of the fact that many of the personnel and facilities necessary to provide the

required service are already in place thus reducing the necessary expenditure. However, in South Africa this is made more difficult by the fragmentation of health services in that the provision of preventive services (e.g. contraception) falls under the Department of National Health and Population Development, whereas the provision of curative services falls elsewhere. Despite the fact that preventive facilities are situated very close to curative services (sometimes even in the same building), it is probable that the medical and nursing staff working in the curative services do not perceive prevention as falling in their sphere of responsibility; this increases the probability of missing opportunities for preventive interventions. This argument is not only relevant to the field of contraceptive intervention among youth; for example, it was found that about 60% of missed opportunities for measles vaccination occurred in major curative facilities in the Western Cape.¹⁶

The principal recommendation arising from this study is that all youth attending primary health care facilities should routinely be offered contraception counselling, just as children have their immunisation status checked. Furthermore, with the important exception of sexually inexperienced youth who are relatively younger and still studying, there are no demographic features or aspects of sexual behaviour suggesting that particular groups should be targeted. The authors have communicated with senior Cape Peninsula day hospital personnel in the hope that these findings will contribute to policy change.

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Paper 4

**Suicide in South Africa. An analysis of nationally registered mortality
data for 1984 — 1986.**

Suicide in South Africa - an analysis of nationally registered mortality data for 1984-1986

(Revised manuscript)

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Key words: Age, gender, homicide, race, South Africa, suicide

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Nationally registered suicide mortality data for South Africa (1984-1986) were analysed. There were 5,448 deaths (1.3%) due to suicide in this period. Proportional mortality and mean annual suicide mortality rates were highest for whites, followed by Asians and then coloureds. The proportional mortality for blacks was similar to that of coloureds. Suicide was relatively prominent as a cause of death for Asian females (15-24 years). For whites, the most commonly used method of suicide was firearms. Except for coloured females, hanging was the most common method used for the other population groups. Political, economic, and religious factors may account for some of the differences. Cultural factors may explain the findings for young Asian females. There is a need for strict gun control legislation.

Little is known about the epidemiology of suicide in South Africa. This information is necessary to inform attempts to reduce the incidence of this form of death, and to focus research efforts. Furthermore, national suicide mortality data can provide insights into the mental health status of the country. An investigation was undertaken with the following aims: (i) to provide an overall assessment of the extent of suicide by documenting the suicide proportional mortality and suicide rates according to gender, age, and population group (as defined by the Population Registration Act of 1950); and (ii) to document the methods of suicide and the ratios of suicide to homicide according to these demographic variables. It was hypothesised that these ratios might differ between the population groups as they are affected in different ways by the prevailing economic and political systems and the high levels of violent conflict in the country. The period 1984-1986 in particular was characterised by continuing dissatisfaction with black education and anger at the ongoing exclusion of blacks from political power. Forms of resistance to government policies included school boycotts, worker stayaways, acts of insurgency, violent confrontations with security forces by township residents, and violent attacks on people allegedly collaborating with the ruling group (1-3).

Materials and methods

Mortality data for 1984-1986 were extracted from computer tapes supplied by the South African Central Statistical Service (CSS). A 3-year period was chosen to increase reliability as large fluctuations in mortality data can occur from year to year. The period 1984-1986 was selected as this is the most recent period for which census data (which is required to calculate mortality rates) is available.

Rates were adjusted for undercount (4), and were not calculated for blacks due to the poor quality of both numerator and denominator data (5). The "homelands" of Transkei, Bophuthatswana, Venda and Ciskei ("TBVC states") were excluded from the analysis since CSS does not provide data for these territories.

An autopsy performed by a district surgeon is required for all deaths with an unnatural cause. The autopsy report is sent to a magistrate. An inquest is then held, the aim of which is to establish the cause of death. This cause is then forwarded to the CSS (6). Causes of death are classified according to a system based on the *International Classification of Diseases* (ICD-9) (7). The term "suicide" is used to denote all deaths reported as due to suicide or self-inflicted injury (ICD-9 categories E950-959 and E979).

Proportional mortalities and mean annual mortality rates were also calculated for deaths due to suicide plus undetermined causes. A death is allocated to the category "undetermined causes" if it cannot be ascribed to a specific external cause, whether it is accidentally or purposely inflicted (ICD categories E980-989) (7). Since only some of the deaths attributed to undetermined causes are in fact due to suicide, the data for deaths due to suicide plus undetermined causes give a higher estimate of the extent of mortality actually due to suicide.

Results

Given the small numbers of deaths due to suicide in the 0-14 year age group relative to other age categories (N=68; 1.2%), the analysis will focus on persons 15 years and older. There were 425,312 reported deaths of people aged 15 years and older in the 3-year period 1984 - 1986. Of these, 5,448 (1.3%) were indicated as suicides.

Mean annual suicide mortality rates per 100,000 of the population were highest in whites, followed by Asians and then coloureds (Table 1). For males, this trend was present for each age group. Although this trend was present overall for females, it was not present for each age group; for example, Asian females aged 15-24 years had a considerably higher suicide rate than their white and coloured counterparts. For each age and population group, males had a higher suicide rate than females.

INSERT TABLE 1 HERE

Similar trends were present for suicide proportional mortality which is the proportion of deaths due to suicide (Table 1). The proportional mortality for female Asians aged 15-24 years was higher than that for their white and coloured counterparts; however for each other population group/gender/age category the proportional mortality was highest for whites, followed by Asians and then coloureds. The proportional mortality for each gender/age category for blacks was similar to that for coloureds. Except for Asian and coloured youth aged 15-24 years, the proportional mortality was higher for males than females in each age and population group category. More than 10% of all deaths of white males aged 15-44 years, white females aged 25-34 years and Asian females aged 15-24 years were attributed to suicide.

Table 2 provides the proportional mortality and mean annual mortality rates for deaths due to suicide plus undetermined causes. Some of the trends displayed in Table 1 with respect to suicide are preserved. For example, for each age and population group, the proportional mortality and mean annual mortality rates are

still higher for males than females. Furthermore, the proportional mortality and mean annual mortality rate for Asian females aged 15-24 years are still higher than for their white and coloured counterparts. However, although the mean annual mortality rate per 100 000 is still highest for whites, followed by Asians and then coloureds, the relevant differences are small and the trend is not preserved across the various age groups. There are no consistent trends with respect to proportional mortality for deaths due to suicide plus undetermined causes.

INSERT TABLE 2 HERE

An analysis of variance was performed on the logit (logistic transformation) of the suicide rate (Table 1) in order to understand the interrelationship between age, gender and population group (and the interaction between these variables) and suicide. The following sources of variance were statistically significant ($p < 0.01$): age, gender, population group, age by population group, and age by gender. The p-values for age, age by population group race and age by gender were of the same order (5×10^{-4} , 4×10^{-3} , 2×10^{-3} respectively) whereas for population group and gender the p-values were substantially smaller (5×10^{-7} for both). This indicates a greater effect for population group and gender main effects than for the other sources of variance.

For whites, the most commonly used method of suicide was firearms (Table 3). Except for coloured females (where "substances" was the most common method of suicide), hanging was the most common method used in the other population group/gender categories. Substances tended to be used more frequently by

females in each population group. It is noteworthy that the second most commonly used method of suicide by black females is "unspecified".

INSERT TABLE 3 HERE

For females aged 15-24 years, the ratio of suicide to homicide was higher for Asians than the other population groups (Table 4). For all other population group/age/gender categories, the ratio was highest for whites, followed by Asians, and then by coloureds or blacks. The ratio of suicide to homicide was greater than 1 for whites of both genders and all ages and for some age categories of Asian females. This indicates that the number of suicides was greater than the number of homicides. For all other population group/age/gender categories, the ratio of suicide to homicide was less than 1. The number of homicides was thus greater than the number of suicides; for example, among coloured males aged 15-24 years there were 17 times as many deaths due to homicide compared to suicide.

INSERT TABLE 4 ABOUT HERE

Discussion

It is a cause for concern that 1.3% of all deaths of persons aged 15 years and over during the period 1984-1986 were due to suicide. In particular, the rates for whites are relatively high by international standards (8). This concern is amplified by the following two factors: (i) many deaths ascribed to other causes (for

example, accidents and assault) may in fact be due to suicide (9,10); and (ii) mortality data do not take into account non-fatal suicide attempts (11-16).

The finding that the suicide rate and (with the exception of Asian females aged 15-24 years) proportional mortality is higher in males than females is consistent with previous findings (17, 18). Various explanations have been put forward to account for this gender difference, including: (i) occupational stress (19); (ii) alcohol abuse (17); and (iii) a tendency for males to use more lethal methods (20, 21). The latter explanation is supported by the findings in this study, where (for each population group) males are less likely to use the less lethal method of substance ingestion.

The population group main effect emerged as being relatively large in the analysis of variance performed on the logit of the suicide rate. Indeed, a striking finding of the study is the trend for suicide and homicide mortality according to population group. The prominence of suicide as a cause of death is greatest for whites, followed by Asians and then coloureds or blacks. However, the suicide to homicide ratios suggest that the converse trend exists for homicide. There are several factors that could explain these findings. Whites generally enjoy a higher standard of living compared to other population groups. It has been shown that suicide rates correlate positively with quality of life (22, 23). Breetzke (24) has argued that those with a higher quality of life may be more likely to have feelings of optimism and high self esteem. Their resilience may thus be less in that they may be less able to cope with difficulties in life; suicide may thus be perceived as the only possible resolution.

Similarly, those with a higher quality of life are less likely to have an outside source to blame for their misery (25, 23) and are thus more likely to regard their

problems as internal. If, on the other hand, there are obvious external sources to which people can ascribe their unhappiness, they are more likely to direct anger outwards resulting in assault and homicide. The finding that coloured, Asian, and black South Africans are more likely to die from homicide than suicide is consistent with this hypothesis (18).

Other writers have referred explicitly to the political context in explaining patterns of violent death in societies characterised by political oppression. It is argued that the violence of the oppressor becomes internalised; the oppressed person is not able to direct hostility towards the oppressor as this would result in further abuse (26, 27). There is thus no other choice but to express this hostility towards other members of the oppressed group, often to family and close friends. This has been described as "horizontal violence" (28). Although these authors were writing in the context of colonialism, much of the argument would be applicable to the South African situation and could explain the relatively high homicide rates for coloured, Asian, and black South Africans.

A further aspect relevant for the trends for suicide by population group is religion. Adhering to a religion such as Islam in which suicide is strongly proscribed reduces the likelihood of committing suicide (20, 30). This may contribute to the relatively low suicide rates among coloureds and Asians since 6,7% and 20,2% of these groups respectively adhere to Islam (31). However, this contribution is likely to be limited since the proportions involved are relatively small. Other factors that have been suggested in explaining the relatively low suicide proportional mortality for blacks include: (i) a propensity for expressing emotion in somatic terms; (ii) the presence of relatively close family ties; and (iii) cultural factors such as taboos against taking one's own life (24, 32-34).

Cultural factors may also partly explain the relatively high suicide proportional mortality and suicide rate among Asian females aged 15 - 24 years. Pillay and Schlebusch (35), based on research conducted among a sample of Indian adolescents who had presented to a South African hospital following a parasuicide, argue that South African Indian adolescents (particularly females) are subject to a large degree of parental restriction. Specifically, they are frequently prohibited from engaging in social activities away from home without adult supervision and from engaging in heterosexual relationships. Many of the parasuicide patients in Pillay and Schlebusch's (35) sample felt lonely and unsupported during times of relationship discord and thus resorted to parasuicide as a means of communicating their distress (36).

Although suicide has multiple determinants and its prediction is difficult given its impulsive quality, there does exist a need for effective prevention strategies. Of particular relevance to South Africa is the necessity for strict gun control legislation (37). Suicide rates are consistently correlated with gun ownership (38, 39). Firearms are prominent as a method of suicide in South Africa, particularly among whites for whom the suicide proportional mortality and suicide rate are relatively high. However, there would be substantial obstacles in implementing this strategy in the face of the high levels of violence that currently characterise the country. Other prevention strategies could include minimising the unnecessary reporting of suicides in the popular media, exercising caution in prescribing antidepressants that are more likely to be fatal in overdose, and improving knowledge and skill in the management of suicidal and depressed patients at primary health care level (39).

Finally, there are some methodological limitations. The data supplied by the

CSS are not of a high quality. The reasons for this are as follows: a number of deaths are not registered by the CSS (4, 5); data are not available for the "independent" homelands; the appropriate underlying cause of death may not be selected from the death certificate since the cause of death may be inadequately completed, may use terms for which no codes are available, or may use several terms with no apparent order (6); and the diagnosis itself is often of a poor quality (5, 40, 41, 42). That this factor is relevant for this study is indicated by the findings that various trends with respect to suicide are not preserved when deaths due to undetermined causes are analysed together with those for suicide. Clearly, the results should be interpreted with some caution in those cases.

A related consideration is that many of the deaths recorded as being due to homicide may in fact be due to political violence: in 1986 alone, at least 1,209 people died in political violence (3). Since these deaths were not proportionately distributed across the population groups and since many were at the hands of the security forces (3), the ratios of suicide to homicide (Table 4) were subject to a source of bias.

A final limitation of the study is that data are provided for one time period only, viz. 1984-1986. This may not accurately describe the situation in the years preceding and following this period, particularly as this was a time of much social disruption as mentioned above. Further research is required to investigate longitudinal trends with regard to suicide and homicide in South Africa. Specifically, it will be necessary to monitor trends in suicide mortality in the light of the changing political and economic scenario in South Africa.

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Table 1

Proportional mortality and mean annual mortality rates per 100 000 for suicide for each population group/gender/age group in South Africa, 1984-1986

Age Group (yrs.)	Whites				Coloureds			
	Males (N=2184)		Females (N=577)		Males (N=349)		Females (N=97)	
	PM*	MR**	PM	MR	PM	MR	PM	MR
15-24	11.8	25.75	9.5	6.58	2.4	9.80	2.6	3.72
25-34	16.1	42.04	12.4	12.14	2.6	18.03	1.4	4.13
35-44	11.8	43.57	6.6	11.70	1.5	16.26	0.6	3.48
45-54	5.5	46.95	3.0	13.97	0.7	12.81	0.3	3.42
55-64	2.3	50.30	1.0	11.45	0.3	9.60	0.1	1.50
65+	0.7	41.27	0.2	6.21	0.1	5.70	0.0	0.56
All ages	3.5	39.93	1.1	10.10	1.0	13.08	0.4	3.38

Age Group (yrs.)	Asians				Blacks***	
	Males (N=191)		Females (N=59)		Males (N=1692)	Females (N=299)
	PM	MR	PM	MR	PM	PM
15-24	8.4	19.74	12.8	11.36	2.5	1.5
25-34	7.4	24.52	3.1	3.94	2.3	1.1
35-44	3.4	20.76	2.8	6.78	1.6	0.5
45-54	1.5	21.66	0.4	2.63	0.9	0.3
55-64	0.8	26.18	0.4	7.65	0.5	0.2
65+	0.3	26.79	0.0	0.13	0.2	0.0
All ages	2.2	21.11	1.1	6.65	1.1	0.3

* = proportional mortality

** = mortality rate

*** = mortality rates not valid for blacks (see text)

Table 2

Proportional mortality and mean annual mortality rates per 100 000 for suicide plus undetermined causes for each population group/gender/age group in South Africa, 1984-1986

Age (yrs.)	Whites				Coloureds			
	Males		Females		Males		Females	
	PM*	MR**	PM	MR	PM	MR	PM	MR
15-24	23.6	51.42	20.3	14.08	11.6	48.08	10.6	15.38
25-34	23.4	61.09	18.1	17.74	10.9	76.34	8.7	25.33
35-44	17.3	63.79	9.9	17.46	6.6	70.30	4.3	25.01
45-54	8.5	72.38	4.8	22.57	10.1	71.47	2.1	23.94
55-64	3.5	76.58	1.8	20.37	1.5	55.8	0.7	15.00
65+	1.2	70.98	0.6	22.16	0.6	52.17	0.4	22.62
All ages	5.6	65.8	2.1	18.59	4.6	62.18	2.4	20.77

Age (yrs.)	Asians				Blacks***	
	Males		Females		Males	Females
	PM	MR	PM	MR	PM	PM
15-24	24.3	56.94	23.1	20.45	14.8	7.6
25-34	21.0	69.18	9.9	12.70	14.3	7.1
35-44	11.8	72.08	4.9	11.87	9.9	4.6
45-54	4.2	61.21	1.0	7.01	5.5	2.4
55-64	2.7	90.76	0.9	16.79	3.0	1.3
65+	1.1	86.72	0.9	57.0	1.2	0.4
All ages	6.7	63.99	2.6	16.34	6.9	2.4

* = proportional mortality

** = mortality rate

*** = mortality rates not valid for blacks (see text)

Table 3

Proportions of suicide victims (with rank order) in each population group/gender who used each method of suicide

Method	Whites		Coloureds	
	Males (N=2184)	Females (N=577)	Males (N=349)	Females (N=97)
Exhaust	21.2 (2)	8.0 (3)	7.4 (4)	3.1 (6)
Firearms	54.7 (1)	58.1 (1)	14.9 (3)	14.4 (2)
Hanging	14.5 (3)	7.1 (4)	53.0 (1)	14.4 (2)
Substances	5.2 (4)	18.4 (2)	17.8 (2)	48.5 (1)
Unspecified	1.7 (6)	2.8 (6)	4.0 (5)	13.4 (4)
Other	2.7 (5)	5.7 (5)	2.9 (6)	6.2 (5)

Method	Asians		Blacks	
	Males (N=191)	Females (N=59)	Males (N=1692)	Females (N=299)
Exhaust	6.3 (4)	0.0 (4)	1.6 (6)	2.0 (5)
Firearms	7.9 (2)	0.0 (4)	7.2 (2)	0.7 (6)
Hanging	74.3 (1)	44.1 (1)	80.1 (1)	59.5 (1)
Substances	6.8 (3)	33.9 (2)	4.7 (3)	14.0 (3)
Unspecified	3.1 (5)	22.0 (3)	4.1 (4)	20.4 (2)
Other	1.6 (6)	0.0 (4)	2.3 (5)	3.3 (4)

Table 4

Ratios of suicide:homicide for each population group/gender/age group in South Africa, 1984-1986

Age group (years)	Whites		Coloureds	
	Males	Females	Males	Females
15-24	2.69:1	2.34:1	0.06:1	0.14:1
25-34	3.77:1	2.66:1	0.08:1	0.08:1
35-44	4.19:1	2.43:1	0.10:1	0.08:1
45-54	4.24:1	4.73:1	0.13:1	0.12:1
55-64	4.39:1	3.40:1	0.16:1	0.08:1 *
65+	3.29:1	1.04:1	0.12:1	0.00:1 *
All ages	3.65:1	2.43:1	0.08:1	0.10:1

Age group (years)	Asians		Blacks	
	Males	Females	Males	Females
15-24	0.59:1	3.75:1	0.07:1	0.15:1
25-34	0.61:1	1.29:1 *	0.08:1	0.10:1
35-44	0.72:1	1.50:1	0.10:1	0.10:1
45-54	0.88:1	0.60:1 *	0.13:1	0.21:1
55-64	0.71:1	1.67:1 *	0.17:1	0.23:1
65+	0.90:1	0.00:1 *	0.20:1	0.13:1
All ages	0.67:1	1.79:1	0.09:1	0.10:1

* In these age, population group, gender groupings the total number of suicides and homicides is too low to gain an accurate assessment of suicide:homicide ratios (N<20)

Paper 5

Suicide in South Africa. Seasonal variation.

Suicide in South Africa - seasonal variation

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The seasonal variation in South African suicide incidence was investigated. Log-linear modelling was performed on nationally registered suicide mortality data for 1980-1989. There was a significant monthly effect with a peak in spring/summer and a trough in winter. This effect was independent of gender, age, and race, except that coloureds and blacks deviated less from the expected pattern in that the winter trough and the summer peak were relatively pronounced. The fact that coloureds and blacks are less urbanised could account for these findings since they more exposed to seasonal variations in environmental influences and social integration. The summer peak for coloureds and blacks may be partly due to the influence of Christmas in that existing hardship may be intensified.

Key words: Age, gender, race, season, South Africa, suicide

Durkheim's observation that suicide has a seasonal variation, with a peak in the spring or early summer and a trough in winter (1), was confirmed in a comprehensive review of the published data by Massing & Angermeyer (2). However, in about one-fifth of the reviewed studies, there was a second, less clearly defined, peak in autumn. This pattern has been found to be more marked in younger persons (2). Furthermore, several authors have reported gender differences in the monthly distribution of suicide, with this additional peak being confined to females (3-6).

The monthly variation in suicide may have important implications for the aetiology and prevention of suicide (4). This report comprises the first analysis of the monthly variation of suicide in South Africa. Besides age and gender, the variable population group or race (as defined by the Population Registration Act of 1950) was included in the analysis since previous work has documented important differences in the epidemiology of suicide between the population groups (7-9).

Material and methods

Mortality data for 1980 - 1989, which is the most recent decade for which data are available, were extracted from tapes supplied by the South African Central Statistical Service (CSS). The total number of suicides in a particular month in all ten years was analysed; this was done to minimise the influence of bias caused by yearly variation. The "homelands" of Transkei,

Bophuthatswana, Venda, and Ciskei ("TBVC states") were excluded from the analysis since data for these territories was not available. An autopsy performed by a district surgeon is required for all deaths with an unnatural cause. An inquest is then held, the aim of which is to establish the cause of death. This cause is then forwarded to the CSS (10). Causes of death are classified according to a system based on the *International Classification of Diseases* (ICD-9) (11). The term "suicide" is used to denote all deaths reported as due to suicide or self-inflicted injury (ICD categories E950-959 and E979). Age was analysed in the categories of the following years: 15 - 24; 25 - 34; 35 - 44; 45 - 54; 55 - 64; and 65 or greater.

The CSS data for 1980 - 1989 were organised in a multi-dimensional contingency table (2x6x4x12), with the first dimension being gender, the second age, the third race, and the fourth month. The four dimensions were denoted by S (gender), A (age), R (race), and M (month), where the single letters S, A etc. denote the main effects of the factors; and A*S denotes both the main effects and their interactions.

Although the quality of the data supplied by the CSS is poor (7,8), there is no reason to think that any sources of bias would affect the monthly trends.

General log-linear modelling was performed to investigate the effects of the four dimensions on the suicide counts. This technique makes no distinction between independent and dependent variables, but is used to examine relationships between categorical variables by examining expected cell frequencies (12). It is assumed that suicides occur independently of each other. Hierarchical models were fitted, implying that if an

interaction was included in the model all the associated lower order interactions and the corresponding main effects were also included. Goodness of fit of the model was measured by the Pearson Chi-squared statistic. Further details regarding the statistical analysis are provided in the Appendix.

Results

There were 16 389 deaths ascribed to suicide in the period 1980-1989. The relevant demographic features are presented in Table 1.

INSERT TABLE 1 HERE

Investigating the statistical significance of partial and marginal effects (Table 2) showed that a provisional model is $S*A*R + R*M$.

INSERT TABLE 2 HERE

After the preliminary selection of the model $S*A*R + R*M$, some models which differed from this one by only a few terms were investigated further. The method of model selection used was that put forward by Aitkin (13) which is based on a similar procedure for the ANOVA of unbalanced cross-classifications.

The final model adopted was:

$$S*A*R + M + junbl + decbl + aprcol + deccol$$

where the last four terms account for the only significant race by month interactions and where *junbl* and *decbl* refer to suicides in the black population in June and December respectively, and *aprcol* and *deccol* refer to suicides in the coloured population in April and December respectively. Overall the fit of the model was good ($X^2=491.6$, $df=513$, $p<0.2495$).

Interpreting this model, it appears that there were no significant differences in the monthly trends according to gender and age group. The monthly effect is, however, significant and independent of any sex, race or age classification apart from the differential effects of coloureds in April and December and blacks in June and December.

There were no differences in the the monthly trends between whites and Asians. Using each race group's January suicide count as the baseline (see Appendix), it appears that for all race groups the March, September and October suicide counts are not significantly different from January. For whites and Asians the counts for February, April, May, June, July, August, November and December are significantly less than for January by as much as 14% in April. The same trend holds for blacks except for December when there is no significant difference between suicide rates in that month and in January. For this group the April rate is 28% less than that for January. For coloureds the counts for February, April, May, June, July, August, and November are significantly less than for January by up to as much as 33% in April. In contrast to Whites and Asians, for Coloureds the count for December was significantly greater than that for January by 24%. For both coloureds and blacks, the winter trough

and the summer peak were more pronounced than for whites and Asians (Figure 1).

INSERT FIGURE 1 HERE

Discussion

In South Africa, spring begins in about September and autumn in about April. Although trends with peaks in spring or summer and troughs in autumn or winter were present, these were not very prominent. This may be due to differences in environmental (14) or psychosocial factors operating in South Africa compared to those operating in the countries where the previous studies were carried out (2)

The existence of a peak in suicide incidence in autumn was not supported by this study. As was mentioned above, this peak was more prominent for younger people (2, 5, 15). Nayha (5) suggests that this could be ascribed to: (i) social life intensifying when transferring from school to working life or tertiary education; and (ii) life becoming more active and thus stressful for younger people after the summer vacation. In South Africa, autumn does not correspond to either of these events, and the factors mentioned by Nayha (5) would thus not be applicable. There are no other reasons to predict that there would be a peak in autumn for young people.

The evidence for gender influencing the monthly distribution of suicide is more substantial than that for age (3-6). However, the finding in this study that gender did not have such an influence indicates that this phenomenon is not universal (16). Factors that have been advanced to account for the

differences between the genders include: (i) differences in the circannual dopamine levels (17); (ii) reduced responsiveness to climatic and natural environmental factors in women compared to men (4); and (iii) differential impact of seasonal changes on social activities, for example reduced social activities in autumn for women but not for men (4). Notwithstanding the fact that none of these explanations are derived from sound evidence, there is no reason to believe that these factors should not also be applicable to South African women. Clearly, the topic of gender differences in the monthly distribution of suicide is deserving of further investigation.

It was found that the monthly variation in suicide varies only according to population group. The low proportions of suicides among coloureds and blacks in April and June respectively, and the high proportion of suicides by coloureds and blacks in December, indicates that the pattern for these groups differs less than that for whites and Asians from the expected pattern. The monthly distribution of suicide in these groups is therefore less likely to be influenced by psychosocial factors than biological factors (18) such as seasonal variations in brain dopamine (17), serotonin (19, 20), or melatonin (6).

Reasons for a possible greater influence of biological factors for these groups include the following. Firstly, the prominence of suicide as a cause of death in these two population groups is low compared to the other population groups (Flisher & Parry, in press). Those that do commit suicide are thus more likely to be influenced by the universal biological factors mentioned above. Secondly, coloureds and blacks are less urbanised (21). They are thus less likely to spend time indoors

and obtain protection from, *inter alia*, insulated buildings, electrical heaters, and air conditioning machines (5). As a consequence, they may be more influenced by seasonal variation in climatic variables and their physiological sequelae (14).

The fact that coloureds and blacks are less urbanised could also affect the monthly trends in suicide by a psychosocial mechanism since being less urbanised results in a larger seasonal variation in communal activities. Durkheim (1) hypothesised that this latter factor would result in increased seasonal variation in suicide as social integration would be relatively increased in winter and decreased in summer.

Finally, the finding that the proportions of suicides committed in December is higher for coloureds and blacks than for the other population groups may be due to the influence of Christmas (5, 22-24). These groups are relatively economically disadvantaged relative to whites and (to a lesser extent) Asians. It is possible that the hardship resulting from this is experienced particularly intensely during the Christmas period for the following reasons: (i) people are not able to afford to celebrate Christmas as they would have chosen to; and (ii) the expenses of Christmas could increase financial adversity. The resulting dysphoria and despair could contribute to the relatively high proportion of suicides of coloureds and blacks in December. An additional factor accounting for the finding that Asians did not have a higher proportion of suicides in December than whites is that only 12% are Christians as compared to 93% and 89% for whites and coloureds respectively (25).

Our finding in this study that the monthly distribution of suicide in South Africa varies according to population group

serves to emphasise the importance of this variable in the epidemiology of suicide in South Africa. The reasons for the differences between the population groups are not obvious, but probably reflect social, cultural, and economic factors (26, 27). This suggests that these factors should not be overlooked in analyses of the monthly distribution of suicide in other countries as well. It is possible that taking these factors into account may contribute to elucidating the reasons for international differences in the monthly trends (2).

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Appendix

Investigating the statistical significance of partial and marginal effects showed that a provisional model is $S*A*R + R*M$. If Y_{ijkl} is the number of suicides recorded for sex i , age j , race k , in month l (ie the number of suicides in the $ijkl$ cell of the table), and μ_{ijkl} is the expected number that occur in cell $ijkl$, then the log-linear model is:

$$\log(\mu_{ijkl}) = \mu + \lambda_i^S + \lambda_j^A + \lambda_k^R + \lambda_l^M + \lambda_{ij}^{S.A} + \lambda_{ik}^{S.R} + \lambda_{jk}^{A.R} + \lambda_{kl}^{R.M} + \lambda_{ijk}^{S.A.R}$$

for $i = 1, 2$; $j = 1 \dots 6$; $k = 1 \dots 4$; $l = 1 \dots 12$

where a λ with any subscript equal to 1 is zero.

Taking the anti-log, we obtain a multiplicative model which factors the counts in the cell into a number of terms, each of which can be associated with sex, age, race, or month and their interactions. The factored count can be written as:

$$\mu_{ijkl} = \exp \mu \cdot \exp(\lambda_i^S) \cdot \exp(\lambda_j^A) \cdot \exp(\lambda_k^R) \cdot \exp(\lambda_l^M) \cdot \exp(\lambda_{ij}^{S.A}) \cdot$$

$$\exp(\lambda_{ik}^{S.R}) \cdot \exp(\lambda_{jk}^{A.R}) \cdot \exp(\lambda_{kl}^{R.M}) \cdot \exp(\lambda_{ijk}^{S.A.R})$$

After the preliminary selection of the model $S*A*R + R*M$, some models which differed from this one by only a few terms were investigated further. Using the method of model selection put forward by Aitkin (1979), the final model adopted was:

$$S*A*R + M + junbl + decbl + aprcol + deccol$$

where the last four terms account for the only significant race by month interactions and where *junbl* and *decbl* refer to suicides in the Black population in June and December respectively, and *aprcol* and *deccol* refer to suicides in the Coloured population in April and December respectively.

For any given sex, race and age group the monthly effect can be interpreted as a factor that modifies the basic count of the group. The monthly factors are given by:

$$\exp(\lambda_I^M) \cdot \exp(\lambda_H^E)$$

where the last term accounts for the above differential effects. The month of January is used as the baseline here, so

$$\exp(\lambda_I^M = 1)$$

The estimates of the monthly effects are given in Table 3 together with an approximate 95% confidence interval. These can be interpreted as the fraction, or if multiplied by 100, the percentage by which the expected number of suicides in any group changes due to a monthly effect. If the approximate confidence interval includes the value 1, then the factor for that month is not significantly different from January.

INSERT TABLE 3 HERE

This table is interpreted in the Results section.

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Table 1

Demographic features of deaths due to suicide (1980-1989) (N=16,389)

	n	%
Gender		
Male	13,240	80.8
Female	3,149	19.2
Population group		
White	8,298	50.6
Coloured	1,440	8.8
Asian	694	4.2
Black	5,957	36.3
Age in years		
15-24	3,222	19.7
25-34	4,606	28.1
35-44	3,414	20.8
45-54	2,370	14.5
55-64	1,505	9.2
65+	1,272	7.8

Table 2

ANOVA Table for sex by Age by Race by Month with suicide count as dependent variable

Effect	DF	Partial Assoc Chi-Square	PROB	Marginal Assoc Chi-Square	PROB
Sex (S)	1	6681.22	0.0000		
Race(R)	3	10693.89	0.0000		
Age(A)	5	2989.13	0.0000		
Month(M)	11	50.25	0.0000		
SR	3	114.66	0.0000	113.96	0.0000
SA	5	21.51	0.0000	20.45	0.0010
SM	11	5.43	0.9084	5.77	0.8880
RA	15	847.22	0.0000	847.77	0.0000
RM	33	53.43	0.0137	55.17	0.0091
AM	55	65.75	0.1520	66.75	0.1331
SRA	15	66.44	0.0000	63.00	0.0000
SRM	33	43.60	0.1026	38.43	0.2371
SAM	55	71.37	0.0680	68.77	0.1003
RAM	167	185.99	0.1496	181.46	0.2101

Table 3

Monthly effects

Race	Month	Factor*	95% limit		Significance
			lower	upper	
White/ Asian	Jan	1.000			
	Feb	0.902	0.838	0.971	Sig**
	Mar	0.945	0.879	1.016	NS
	Apr	0.860	0.797	0.929	Sig
	May	0.912	0.848	0.982	Sig
	Jun	0.866	0.794	0.944	Sig
	Jul	0.885	0.822	0.953	Sig
	Aug	0.896	0.832	0.965	Sig
	Sep	0.938	0.872	1.009	NS
	Oct	0.964	0.897	1.037	NS
	Nov	0.924	0.858	0.994	Sig
	Dec	0.857	0.783	0.939	Sig
Coloured***	Apr	0.665	0.523	0.846	Sig
	Dec	1.237	1.009	1.516	Sig
Black***	Jun	0.718	0.617	0.836	Sig
	Dec	1.056	0.912	1.224	NS

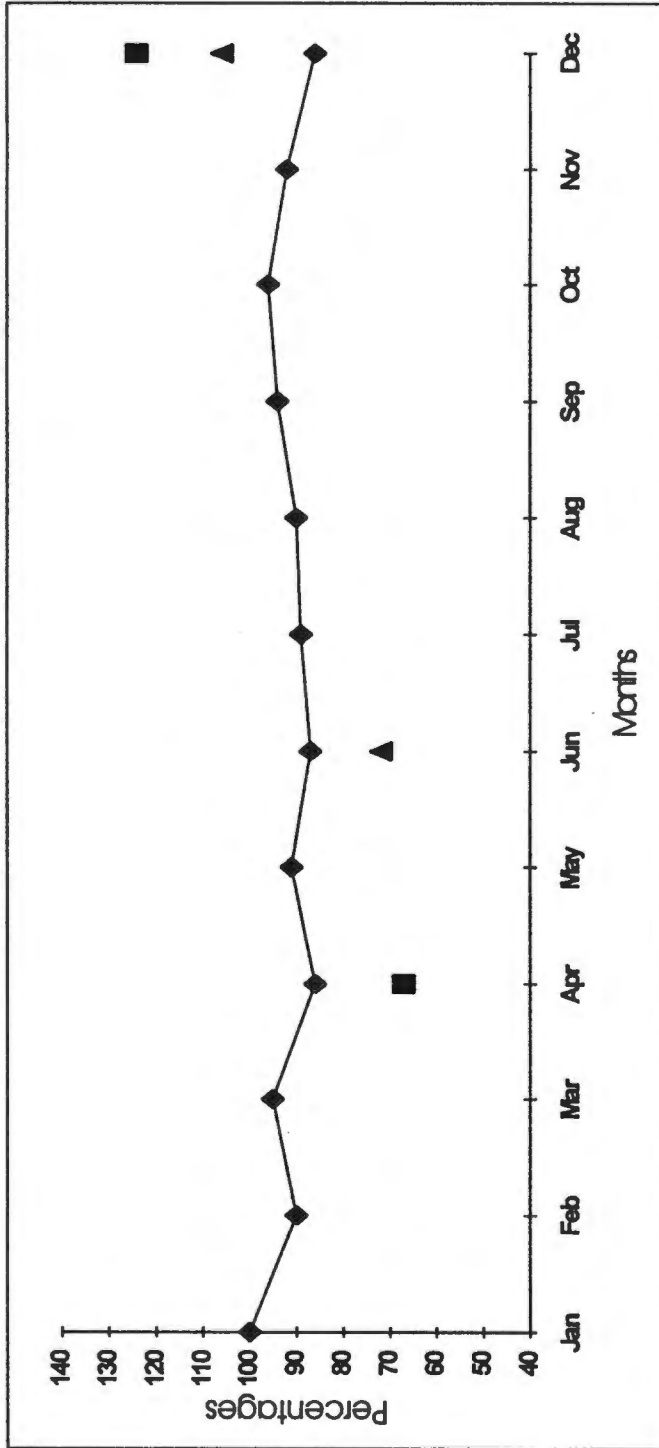
* The proportion of suicides in a given month against the number of suicides in January for a particular race group

** Sig = significant ($p < 0.05$). NS = non-significant

*** For coloureds and blacks only the factors that are significantly different from the Asians and whites are given. The factors for the remaining groups are the same as for Asians and whites.

Figure 1:

Percentages by which the expected number of suicides in each population group changes due to a monthly effect, relative to the expected number of suicides in January, for each month*



* For coloureds and blacks only the percentages that are significantly different from the Asians and whites are given. The percentages for the remaining groups are the same as for Asians and whites.