The Office of the Chief of Police in Berlin **BERLIN**

TRAFFIC CRASHES
involving
BICYCLISTS

A special research project
concerning bicycle crashes
in West Berlin in the
years 1981 through 1985

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1 General

The continual increase in motor traffic in recent decades has, probably inevitably, led to an upward trend in the numbers of traffic crashes, which trend has been interrupted only infrequently. This trend, and the bicycling boom which began in the 1970s, have led also to an increase in crashes involving bicyclists. These crashes attract special attention from the public, as many have serious consequences.

Bicyclists' subjective perception of the risk of being involved in a crash has led in the past to discussions which have been, in part, emotional. This project seeks to provide a basis of factual information.

The official crash statistics which must be collected under the law provide only general information about involvement, severity etc. for bicyclists. More thorough evaluation of bicycle crashes is not possible using the official statistics. For this reason, the Berlin police chief has had the traffic division conduct a special data collection and analysis of bicycle crashes since 1981.

The work which follows describes only trends in crashes as such, without attempting to explain them. Nonetheless, it is important to note emphatically that the facts about bicycle crashes established here can not be interpreted without reference to further measurements (amount of bicycle traffic, and its increase; its distribution on streets with and without sidepaths; expansion of the sidepath network). As an example, lacking this awareness, the false impression might arise that streets with sidepaths are more dangerous

than those without. To counter this impression, note that about 90% of the sidepath network (about 450 km) is on major streets with priority at intersections (about 720 km). Precisely these streets have a high traffic volume, and they also attract bicyclists to some extent.

This research work might, however, provide an incentive for further, more detailed scientific research into the characteristics of bicycle crashes. Additional parameters might, for example, be

- Type of street (arterial streets between or within urban centers, business streets, residential collector streets, residential streets)
- Cross-section
- Urban design parameters
- Population parameters

These parameters could not be analyzed in the following research work.

2 Crashes involving bicyclists, general overview

2.1 Bicyclists injured in crashes in the Federal Republic of Germany

Table 1 illustrates trends in numbers of persons injured in all traffic crashes and in bicycle crashes in the years 1970-1985.

It shows that the total number of persons injured in crashes decreased by 120,589 (-21.9%). The trend in built-up areas was similar, with a decrease of 64,173 (-18.9%).

The trend in the numbers of bicyclists injured in crashes, on the other hand, is opposite. There was an increase from 42,366 to 60,002 between 1970 and 1985, +41.6%. It is especially noteworthy that the number of bicyclists injured in crashes went up from 7.7% to 13.9% as a percentage of the total.

This trend is primarily due to changes in crash statistics in built-up areas, where the number of bicyclists injured in crashes rose from 35,531 in 1970 to 52,972 in 1985, an increase of +48.6%. Here also, bicyclists increased from 10.5% to 19.2% of the total, considerably more than for the Federal Republic taken as a whole.

2.2 Bicyclists injured in crashes in West Berlin

Table 2 shows the trend in the total number of people injured in crashes in West Berlin for the years 1970-1985. The total decreased from 18,146 to 14,771, or -18.6%. However, the number of bicyclists injured in crashes increased from 1,153 to 2,654, that is, by 130.2%. The absolute number, then, more than doubled. The number of bicyclists injured in crashes as a percentage of the total almost tripled, from 6.4% to 18.0%.

2.3 Comparison of the Federal Republic of Germany with West Berlin

Comparing the percentage of bicyclists injured in crashes to the total for the entire research period 1970-1985 (table 3), it can be seen that the percentage for Berlin is below that for the Federal Republic in the years 1970 through 1977. In these years, the percentage of injured bicyclists in Berlin increased from 6.4% to 9.1% of the total, while it increased from 7.7% to 9.4% in the Federal Republic. Since 1978, however, the percentage in Berlin has increased beyond the average for the Federal Republic, reaching 18.0% in 1985, when it was 13.9% in the Federal Republic.

As a city-state, Berlin must, however, be compared with built-up areas in the Federal Republic. While the percentages in Berlin increased from 6.4% to 18.0% in the years 1970-1985, the percentage of bicyclists among people injured in crashes in built-up areas in the Federal Republic was already 10.5% in 1970, and it increased to 19.2% in 1985. The values for Berlin, then, were noticeably below those for the Federal Republic, with the greatest difference, 5.3%, occurring in 1971. In 1985, on the other hand, the Berlin percentage was only 1.2% below that in built-up areas in the Federal Republic.

Another index which may be used in comparing Berlin with the Federal Republic is a number describing the average severity of bodily injury (killed, seriously or slightly injured) of the persons injured in crashes.

Weighting:

Killed	130
Seriously injured	70
Slightly injured	5

Table 4 gives the corresponding average severities for the period 1970 through 1985 for all persons injured in crashes and for bicyclists, in the Federal Republic, in the built-up areas and in Berlin.

It can be seen that the average severity for all persons injured in crashes has decreased significantly in all three geographical areas.

In the Federal Republic, the severity has decreased from 28.8 in 1970 to 24.9 in 1985. In built-up areas, it has decreased from 25.9 to 21.5; in Berlin, from 19.9 to 15.5

Comparison of these numbers shows that the severity of crashes is markedly lower in Berlin than in the Federal Republic taken as a whole. Even when compared with the built-up areas in the Federal Republic, Berlin does significantly better. Furthermore, it can be seen that the values for the Federal Republic taken as a whole, for the built-up areas in the Federal Republic, and for Berlin have kept a fairly stable relationship, though they all fall. The figures for Berlin vs. the Federal Republic have differed by 8.1 to 10.2 points (average 9.37) and those for Berlin vs. the built-up areas in the Federal Republic have differed by 5.1 to 6.9 points (average 6.16).

More-or-less similar trends can be identified for the bicyclists injured in crashes. Here as well, there are downward shifts from higher values in 1970 to significantly lower values in 1985.

The entire Federal Republic	31.4 to 24.5 points
Built-up areas in the Federal Republic	27.8 to 22.5 points
Berlin	18.6 to 13.6 points

However, the differences between the values for Berlin and those for the Federal Republic as a whole, or built-up areas in the Federal Republic, are greater for the bicyclists injured in crashes than for all persons injured in crashes. Between Berlin and the entire Federal Republic, the differences are between 10.5 and 14.6 points (average 12.19). Between Berlin and the built-up areas, they are between 7.8 and 11.3 points (average 9.48). Also, the values for the bicyclists injured in crashes in Berlin are consistently significantly below those for all persons injured in crashes, while the values for bicyclists injured in crashes in built-up areas in the Federal Republic are, on the other hand, consistently higher for the bicyclists than for all persons injured in crashes. To summarize, it can be stated that the average severity of injury for bicyclists injured in crashes in Berlin is markedly lower than that in the Federal Republic.

The values for 1985 are:

The entire Federal Republic	24.5 points
Built-up areas in the Federal Republic	22.5 points
Berlin	13.6 points

3 Crashes involving bicyclists in West Berlin

3.1 Prefatory note

In the material which follows, all crashes involving bicyclists are analyzed using the special data assembled by the Traffic Division, i.e., including even crashes in which no injury occurred, but rather, only minor property damage -- less than 1000 DM for any person until 1983, and from then on less than 3000 DM. Such crashes were not included in the official crash statistics compiled by the provincial statistical office. A comparison of the official counts with those of the special study conducted by the police is therefore not possible.

3.2 Bicycle crashes in the years 1977 through 1985

Table 5 compares the trends in Berlin for all crashes and for bicycle crashes.

The number of crashes of all types rose from 74,943 to 95,078 in the years 1977 through 1985, a relative increase of 26.9%. In the same time period, the number of bicycle crashes increased from 1.954 to 3,512, or 79.7%, three times the rate for all crashes. A comparison taking 1977 as 100 makes the trend through 1985 especially clear:

All crashes	127
Crashes involving bicyclists	180

The bicycle crashes have increased not only in absolute numbers, but also, their percentage has increased from 2.6% in 1977 to 3.5% in 1985. Note, however, that the trend has leveled off beginning in 1983.

3.3 Severity of crashes involving bicyclists, 1981-1985

Table 6 categorizes crashes in the years 1981 through 1985 according to the most serious consequence.

Bicycle crashes increased from 2,811 to 3,512 (24.9%) in this period, but the trends were different for different types of crashes. Crashes resulting in injury increased, as did those resulting in minor property damage. There was a downward trend in fatal crashes, though the small absolute numbers do not allow a firm conclusion about this.

Crashes resulting in serious property damage also decreased, though the change in the limit from 1000 DM to 3000 DM in 1983 prevents a fair comparison.

Table 7 gives the relative percentages for various types of crashes, and shows that the relationship between crashes resulting in bodily injury and those resulting only in property damage remained very stable, though the numbers of both types of crashes increased. The percentages of each type of crash remained nearly constant over time.

3.3.1 Severity for bicyclists

Table 8 shows the severity of crashes for bicyclists in the years 1981 through 1985. Again, note that the numbers here can not be compared with the official statistics.

No distinct trend can be identified for bicyclist fatalities, though injuries have increased by 31.8%, from 1,903 in 1981 to 2,509 in 1985.

Despite the increase in the number of bicyclists injured in crashes, the percentage in which the bicyclist suffered only minor or no loss (in which case there was a loss only for another person) remained relatively stable, at 31.6% in 1981 and 28.2% in 1985.

In this context, it should be noted that the percentage of crashes involving only the one bicyclist and no other person is rather high:

1981	218	7.7%	(of all bicyclists involved in crashes)
1982	295	8.9%	
1983	359	10.2%	
1984	300	9.0%	
1985	350	9.9%	

Though the trend is not constant, a significant increase between 1981 and 1985 can be discerned, both in the absolute numbers and in the percentages.

3.3.2 Severity for other persons

Table 9 shows the severity for other persons in crashes involving bicyclists. Because of different use characteristics of other persons (primarily motorists) compared with bicyclists, severity also differs. Bodily injury predominates among bicyclists, but only property damage is recorded for more than half of the other persons:

1981	1,426	55.0%	(of the consequences for all other persons)
1982	1,669	55.0%	
1983	1,665	52.9%	
1984	1,652	54.1%	
1985	1,681	53.2%	

There were only minor changes in absolute and percentage values for property damage in the years 1981 through 1985.

3.4 Bicycle crashes, by month of the year

Table 10 shows the absolute and relative values for trends in bicycle crashes for each month in the years 1981 through 1985.

Comparing the values for each month makes it clear that the number of bicycle crashes increases slowly from January through April. Clearly, May is the month in which bicycle traffic achieves its greatest increase in relation to other traffic year after year. In this month, the number of bicycle crashes is nearly twice that in April. On average, for the years 1981 through 1985, April accounted for 8.0% of all bicycle crashes, while May accounted for

14.1%. The average of the levels then remains the same until August, when it declines slightly to 12.5%. Thereafter, it declines markedly. The lowest average is for January, which accounts for 1.2% of all crashes involving bicyclists. (See table 11.)

A look at the values for individual months makes it clear that there is no single peak month during the summer. Rather, the influence of summer vacation periods, which change from year to year, seems apparent. There is a slight reduction in the number of bicycle crashes during these times.

Also, though it is absolutely not a new observation, the data referenced above show very clearly that the bicycle can be described as a fair-weather vehicle. If the months of January through March and October through December are taken together as a winter half-year and compared with the summer half-year (April through September), this is even more evident: approximately 77% of all bicycle crashes in the years 1981 through 1985 occurred during the summer half-year (see table 12).

3.5 Bicycle crashes, by day of the week

Table 13 shows the trends for bicycle crashes by day of the week in the years 1991 through 1985.

A uniform weekly pattern is evident throughout these five years. To be sure, there is a distinct peak day among the first five days of the week (Monday through Friday) in each of these years, but this peak day falls three times on a Friday, and once each on a Thursday and a Wednesday. On the weekend,

however, the numbers are significantly lower. Taking the average for each day of the week during the years 1981-1985, it can be determined that bicycle crashes increase from 15.5% on Mondays to a first peak value of 15.9% on Tuesdays, then after a brief decline to 15.7% on Wednesdays, increase again to their highest value of 16.7% on Fridays (see Table 13).

The weekly pattern of bicycle crashes for 1985 is similar to that for all crashes in Berlin (see Table 14).

3.6 Bicycle crashes, by time of day and age group

Table 15 shows the distribution of bicycle crashes through the hours of the day in the years 1983 through 1985.

Although the three years show moderate differences in the relative percentages for each hour of the day, a similar pattern over the course of a day is nonetheless recognizable. From a very low value during the late night hours, the percentage of crashes rises to a first peak in the hour from 7 to 8 AM (average value for the three years, 4.5%). In the following hours, the percentages fall slightly, again rising significantly after 10 AM. The highest value is attained in the hour between 4 and 5 PM (average value 12.3%.

It can be seen that more than 32% of all crashes involving bicyclists occur in the afternoon hours between 3 and 6 PM. This value is very significantly

higher than the one for all crashes with bodily injury or serious property damage, which amount to 25% in the same time period. More than half of all bicycle crashes (55.1%) occur in the six hours from noon till 6 PM. The daily pattern for bicycle crashes is similar to that for all crashes with bodily injury or serious property damage, except that the peak values for bicycle crashes are significantly higher than for all crashes.

Separating the hourly distribution of bicycle crashes for the year 1985 into four different age categories (0 to 14, 15 to 24, 25 to 64 and 65 to 99 years) reveals some differences (see table 16). Three peak hours are apparent for the youngest bicyclists, up to 14 years of age.

7 to 8 AM	7.0%
1 to 2 PM	10.3%
4 to 5 PM	14.5%

(These correspond to the beginning and end of the school day). For bicyclists over 64 years of age, the morning hours are especially significant.

The peak hour for the older bicyclists is 10 AM to 11 AM, with 17.4%. Almost half of all crashes for this age group (47.1%) occurred in the middle of the day, from 10 AM to 2 PM.

For 15- to 24-year olds, the peak values were 4.7% from 7 AM till 8 AM, and 12.7% from 4 PM till 5 PM. A peak of 8.6% is discernible in the middle

of the day, from 1 PM till 2 PM. An influence of school hours may also be noted in this age group.

The age group from 25 through 64 years shows only a single peak, with 12.0% from 4 to 5 PM. No clear peak early in the day is identifiable. Rather, the four hours from 6 AM till 10 AM show almost the same percentages (3.5% to 3.7%).

3.7 Bicycle crashes by day of the week and hour of the day

Tables 20 and 21 show the absolute and relative values for bicyclists involved in crashes in 1985, by day and hour.

The work days, Monday through Friday, show the same peaks, which reflect the usual travel habits of bicyclists.

On these days, the first peak hour is 7 to 8 AM, when many students are on their way to school. The second peak on work days is between 1 and 2 PM, corresponding to the end of the school day for many students. The third peak hour, with the highest value for the day, is from 4 to 5 PM, with percentages of 11.8% to 16.8%. This peak corresponds, in any case, to the peak for crashes of all types.

On Saturday and Sunday, the peak hours are entirely different, reflecting bicyclists' entirely different travel patterns. On Saturday, the peak hour,

with the highest daily value of 12.5%, is from 11 AM to noon; another peak is recognizable from 5 to 6 PM, at 9.1%. On Sunday, on the other hand, the peak hours are 1 to 2 PM with 11.1%, and the two hours 5 to 7 PM with 11.4% each.

Calculating the average age of bicyclists involved in crashes in 1985 reveals the different travel patterns and the age structure especially clearly (see table 22). From 6 AM to 7 AM, the average age on work days is between 31.0 and 41.3 years (weekly average 35.4 years). At this time, the "working population" is recognizably underway. In the following hour from 7 till 8 AM, the average age decreases to between 20.7 and 25.8 years, as more students are bicycling (see also the age structure in table 19). After 8 AM on work days, the average age of bicyclists again rises markedly, to between 30 and 40 years.

3.8 Age of bicyclists involved in crashes

Table 17 shows the involvement of bicyclists in crashes by year and age group. It can be seen that the involvement of the different age groups did not remain constant from 1977 through 1985; rather, there were significant shifts. As the different age groups, however, are not uniform in the scope of

their age range (due to the need to conform the table to the official traffic statistics), it is better to observe the trends in each age group.

In 1977, 10- through 14-year-old bicyclists were involved in 636 crashes, and in 1985, in 490, corresponding to a decline of 23%. But on the other hand, 15- through 17-year old bicyclists were involved in 295 crashes in 1977 and 420 in 1985, an increase of 42.4%. Even more extreme changes occurred with the 25- through 34-year-old bicyclists, with 172 crashes in 1977 and 592 in 1985 (+244%) and also with the 35- through 44-year-old bicyclists, with 176 crashes in 1977 and 427 in 1985 (+142%).

The shift in involvement of the age groups is seen more clearly when the numbers are normalized to reflect the number of years in each age group (table 18). Following an initial increase through 1979, the value for 10- through 14-year olds fell from 127.2 crashes for each year of age within the age group in 1977, to 98 in 1985. For 15-through 17-year olds, on the other hand, the values increased from 198.3 in 1977 to 140 in 1985. The average crash involvement per year of age changes even more markedly in the older age groups: for the 18- through 20-year olds, from 22.7 to 95 crashes and for the 21- through 24-year olds, from 14.5 to 96.8 crashes.

These average values, however, can not be compared well, as they give only the average for different years of age within each age group. More precise numbers are available only for the years 1983 through 1985. Table 19 shows these for bicyclists up to 25 years of age. It can be seen clearly that the

distribution by year of age within each age group is not uniform. In 1983, the 14-year-old bicyclists were involved in 201 crashes out of the total of 3,509 -- 5.7%, the largest percentage for any year of age. The shift of the largest number of crashes from 14 years of age in 1983 to 15 in 1985 confirms, however, that the trend is for more and more "older" bicyclists to be involved in crashes in more recent years. The following list showing the percentage of bicyclists up to 20 years of age among the total of those involved in crashes further confirms this:

1977	1978	1979	1980	1981	1982	1983	1984	1985
62.4	60.7	54.6	57.0	54.4	47.9	47.2	44.3	39.8

Relative percentage of 0-20 year old bicyclists

In 1977, bicyclists up to 20 years old still accounted for 62.4% of those involved in crashes, but by 1985 the percentage had fallen to 39.8%. In spite of this, the absolute numbers increased from 1,220 to 1,395, or by 14.3%, during the same time period.

3.9 Gender of bicyclists involved in crashes

Table 23 shows the genders of bicyclists involved in crashes in the years 1981 through 1985. It is especially clear that males are seriously over-represented, with almost 3/4 of all crashes.

To be sure, there was some change in the ratio during these 5 years, 75.2% male in 1981 and 71.3% in 1985, though no distinct trend toward an equal representation of both genders can be inferred. If we also look at the average age for both genders, some differences are clear, as can be determined from the following overview:

Year	Average age of bicyclists, in years		
	Total	male	female
1983	27.0	24.6	29.9
1985	27.9	26.2	29.0

It can be seen that the average age of the female bicyclists, at 29.9 years (1983) and 29.0 years (1985), is significantly greater than that of the males, at 24.6 years (1983) and 26.2 years (1985). However, the difference in age between the genders has decreased from 5.3 years in 1983 to 2.8 years in 1985.

3.10 Nationalities of bicyclists

Table 24 shows the nationality and gender of bicyclists involved in crashes in 1985.

It can be seen that the involvement of foreigners in crashes is unremarkable. Germans account for 87.5 percent of bicyclists involved in crashes, and

other nationalities account only for small percentages. Turks, with 4.6%, have the highest percentage among foreigners.

There are significant differences in the involvement of the two genders, especially with Turks. While female bicyclists account for almost 30% of the Germans involved in bicycle crashes, only 8.4% of the Turkish bicyclists involved in crashes are female.

	Male	Female
German	70.5%	29.4%
Turkish	92.0%	8.4%

3.11 Person at fault, and causes of bicycle crashes

In order to arrive at an understanding of the causes of crashes as quickly as possible, the person at fault and the causes are identified when the crash is reported by a police officer, using a list of causes of crashes which is applied uniformly throughout the Federal Republic. These causes are regarded as preliminary. They are not intended to influence the final legal evaluation of the crash, but rather, they are used only for the purpose of crash prevention.

Table 25 shows who was recorded as at fault in bicycle crashes in the years 1977 through 1985.

The percentage of bicyclists at fault was 61.6% in 1977, then fluctuating up and down slightly, and decreasing to 55.8% in 1985. However, the absolute number of bicyclists causing crashes had increased from 1,192 (1977) to 1,961 (1985), a relative increase of 64.5%.

Corresponding data is available for non-bicyclists involved in bicycle crashes only starting with 1981. In this year, 1,332 were at fault, corresponding to 47.4% of the crashes. Up through 1985, the number of other persons at fault rose to 1,951 (+46.5%), and 55.5% of the crashes. It must be noted that the crashes are sometimes caused both by the bicyclist and by another person. For example, in 1985, both were held to have caused 463 bicycle crashes (13.1%). This number also had increased since 1981.

Selected recorded causes of bicycle crashes are listed in Table 26. While there are moderate shifts in the percentages of different causes, some dominant causes are clearly discernible. In order of frequency during the years 1981-1985, these are:

1.	Error when turning	21.8%
2.	Incorrect position on the roadway	17.4%
3.	Incorrect entry into moving traffic	13.4%
4.	Insufficient safety distance	13.0%

5.	Inappropriate speed	10.5%
6.	Failure to obey traffic signals	7.0%
7.	Careless opening of car door	5.9%

All in all, it can be seen that five causes accounted for 3/4 of all crashes. Note, however, that the bicyclists' and motorists' causes must be clearly differentiated, as they reveal very different patterns (see details in later sections).

4 Bicycle crashes on streets with and without sidepaths

The question as to whether a bicycle crash occurred on a street with or without sidepaths is of considerable importance. The identification of the crash location at an intersection as "with or without sidepath" is based on the location of the bicyclist preceding the crash, i.e., whether the street the bicyclist was using immediately before the crash had a sidepath or not. Crashes on streets with sidepaths need not occur *on* the sidepath.

Tables 27 and 28 show the trend in bicycle crashes on streets with and without sidepaths in the years 1981 through 1985.

There was an increase from 2,811(1981) to 3,512 (1985), or about 25%, in all bicycle crashes during this period. Categorizing them by the type of street, however, reveals very distinct differences. On streets without sidepaths, the number of crashes increased from 2,037 in 1981 to 2,268 in

1984, (approximately +11%), but then it decreased significantly, by -18%, to 1,854 in 1985.

On the other hand, the number of crashes on streets with sidepaths more than doubled from 1981 to 1985.

There were 774 of these crashes in 1981, and 1,658 of them in 1985, a percentage change of +114%. Significantly, the relative percentage of streets with and without sidepaths also changed (see table 27). 27.5% of crashes occurred on streets with sidepaths in 1981, but the percentage had risen to 47.2% -- nearly half -- by 1985. Approximately one in every four crashes occurred on streets with sidepaths in 1981, but nearly one in two in 1985. Correspondingly, the percentage of crashes n streets without sidepaths fell from 72.5% in 1981 to 52.8 in 1985.

These numbers must, however, be interpreted in relation to the existing street network with and without sidepaths. Tables 29 and 30 relate the total length of streets with and without sidepaths to the number of crashes.

In 1981, on the 401.7 km of streets with sidepaths, there were 1.93 bicycle crashes per kilometer, or to put it another way, a crash every 519 meters. In 1985, there were 3.32 crashes per km, or one every 301 meters on a sidepath network along 499.1 km of streets.

On the 2,350 km of streets without sidepaths, on the other hand, there were 0.87 crashes per km in 1981, or one crash every 1.154 km. In 1985,

the rate had decreased to 0.82 crashes per km, or one every 1.215 km. The length of the street network without sidepaths decreased by 97 km during this time period.

The general remarks in section 1 should especially be noted here.

4.1 Bicycle crashes on streets with sidepaths

4.1.1 Severity of crashes

Table 31 shows trends in bicycle crashes on streets with sidepaths for the years 1983 and 1985.

While all bicycle crashes increased by only 0.1% between these two years, crashes on streets with sidepaths increased by 30%, from 1,275 in 1983 to 1,658 in 1985.

Crashes with	fatality	approximately	0.4%
	Serious injury	approximately	11.5%
	Slight injury	approximately	68%

These percentages hardly changed between the two years, even though there were significant increases in the absolute values. The number of crashes with serious bodily injury increased by 30.1% and of those with slight injury, by 31.4%

The direct consequences for the bicyclists, naturally, have the strongest influence on these numbers, as Table 32 makes clear. It can, in particular, be seen that the consequences for the bicyclists change more than the crash

types as described above. So, serious injuries to bicyclists on streets with sidepaths increased by 36.4% between 1983 and 1985, while crashes with serious injuries on these streets increased by 30.1%.

It is interesting, however, that the bicyclist suffered no property damage, or only slight property damage, and no bodily injury, in approximately one of every four crashes on streets with sidepaths. Conversely, bicyclists suffered bodily injury in approximately 75% of crashes on streets with sidepaths. Here also, a slight increase between 1983 and 1985 can be discerned: 1983, 72% bodily injury, 1985, 74%.

4.1.2 Bicycle crashes by location along the street

Table 33 shows trends in bicycle crashes on streets with sidepaths according to location along the street, defined as intersections and locations between intersections. Crashes at intersections include not only those at crossings of streets and at T intersections, but also those within the immediate influence of an intersection -- that is, in the entry and exit areas. "Intersection" is used broadly here, with no distinction between T intersections and four-way intersections.

As table 33 shows, the majority of bicycle crashes on streets with sidepaths occurs at intersections. In 1983, there were 698 crashes at intersections, but the number of such crashes increased to 1,057 in 1985, an increase of over

50% in two years. The percentage increased from 54.7% in 1983 to 63.8% in 1985.

Crashes between intersections increased only by 24, from 577 to 601, during the same time period. Because of the increase in crashes at intersections, the percentage between intersections decreased from 45.2% in 1983 to 36.2% in 1985.

If the average severity of crashes is examined along with the location, trends in crashes at junctions take on a special significance.

The average severity of crashes is calculated according to the following weighting:

Crash with *)	fatality	130
	serious injury	70
	slight injury	5
	only property damage	1

*) as most serious consequence

The average severity of all bicycle crashes decreased by 3.0% from 1983 to 1985. On the other hand, the average severity of crashes on streets with sidepaths increased slightly, by 0.6% (see Table 34). The severity of these between intersections decreased from 12.28 in 1983 to 11.77 in 1985, or by -4.2%, while the severity at intersections increased from 11.99 in 1983 to 12.44 in 1985, or by + 3.8%. It can be seen that the average severity at intersections is higher than between intersections (difference of approximately 12%).

4.1.3 Bicycle crashes between intersections, by location of collision

Table 35 describes the locations of the points of impact -- roadway, sidewalk, sidepath -- of bicycle crashes between junctions on streets with sidepaths.

It can be seen that majority of crashes between intersections on streets with sidepaths occur, as is to be expected, on the sidepath. In 1983, 472 (81.8%) of the 577 such crashes were recorded as on the sidepath, and in 1985, 495 (82.3%) of the 601 crashes were so recorded. The percentage hardly changed.

Correspondingly, the percentages for the other locations of points of impact were small. 11.8% of the crashes in 1985 occurred on the roadway, and 5.8% on the sidewalk, with absolute numbers of 71 and 35 crashes (of 601 in all).

Crashes between intersections on streets with sidepaths increased only slightly, by 4.2%, from 1983 to 1985, though there were somewhat larger changes in the three different types of locations of points of impact. However, the changes for crashes on the roadway and the sidewalk should not be given too much significance, as the absolute numbers for them are rather low.

If the average severity is used to judge crashes between intersections (Table 36), then those on the sidewalk prove to have not only the lowest absolute numbers, but also the lowest absolute average level of severity in 1983 and 1985, 5.6, while those on the sidepath have a value of 12.19 and those on the roadway, a value of 11.86.

While the severity of crashes on the sidewalk declined by more than half (-51.0%) from 1983 to 1985, and on the roadway, by -29.2%, severity of crashes on the sidepath increased by +4.6%.

One type of location proves to pose a particular problem with crashes on the sidewalk and sidepath: entrance and exit driveways. In 1985, 8 (22.9%) of 35 crashes on the sidewalk and 173 of 495 (34.9%) on the sidepath occurred on or near driveways. However, it is also necessary to consider the average severity of these crashes. While the average severity of crashes on the sidepath was 12.19, the value for crashes on or near driveways was only 4.66, even though 169 of these 173 crashes were with motor vehicles. For the crashes on the sidewalk (35 in 1985), the average severity was 5.6, and for the 8 of these on or near driveways, severity was 3.5.

4.1.4 Causes of bicycle crashes on streets with sidepaths

The main causes of bicycle crashes on streets with sidepaths in the year 1985 are listed in Table 35.

In 1985, the following, shown in decreasing order of frequency, were the main ones:

1.	Error in turning right	22.7%
2.	Incorrect location on roadway	18.9%
3.	Entry into moving traffic	10.9%
4.	Inappropriate speed	10.1%
5.	Failure to heed signs requiring yielding	9.0%
6.	Error when turning left, with oncoming traffic	7.4%

Notwithstanding this list, it must be stated that errors in turning, as the sum of the three subtypes "error in turning right", "error in turning left" and "error in turning left with traffic in the opposite direction" represented the most common causes of crashes on streets with sidepaths in 1985.

It must also be noted that there are very pronounced differences between crashes between intersections and at intersections. While the most common cause at intersections, at 24.0%, is error in turning right, the most common cause between intersections, at 24.3%, is incorrect lane use (for example, failure to use the sidepath when available, or use of the sidepath in the wrong direction). In the case of crashes at intersections, all types of errors in turning, taken together, account for 43.4%; between intersections, errors in entering moving traffic account for 16.7%, and they are the second-most-important cause of crashes.

4.1.4.1 Severity as related to specific causes of crashes

Table 38 shows the average severity for selected causes of crashes on streets with sidepaths.

This compilation of data makes it clear that different causes lead to crashes of different severity. So, for example, in 1985, the cause "failure to obey the rule of priority for traffic coming from the right" had the greatest severity, 21.2, on streets with sidepaths. Next were "inappropriate speed", with a value of 20.2 and "driving under the influence of alcohol" with 19.2.

The average severity on streets with sidepaths differs only slightly depending on whether crashes occurred at or between intersections. While average crash severity was 11.77 on the street, it was 12.44 at intersections. Between intersections, error in merging was the cause with the greatest severity, at 26.7, although it was recorded only for three crashes. At intersections, alcohol use had the highest value, at 23.5 (average severity at intersections 12.44). And at intersections, crashes involving cross traffic -- especially the causes "failure to obey the rule of priority for traffic coming from the right", "failure to heed signs requiring yielding" and "failure to

obey traffic signals" led to higher severity than parallel-path errors (for example, "incorrect merging" or "insufficient safety distance".

Even the very typical movements when turning must be considered very differently depending on direction of travel. Left-turning crashes have an average severity of 14.3 (average for intersections, 12.44), the highest severity value for errors when turning. While crashes while turning left with traffic in the opposite direction had a value of 12.1, the value for right-turning crashes was only 9.7, well below the average for all crashes at intersections.

4.1.4.2 Causation by bicyclists

Table 39 shows how bicyclists caused crashes on streets with sidepaths in 1985.

Bicyclists were recorded as causing, or being partly responsible for causing 778 of the 1,658 crashes, or 46.9%.

The following were the main causes, in order of frequency:

1.	Incorrect use of the roadway, or prohibited use of other parts of the street/sidewalk	35.3%

2.	Inappropriate speed	19.2%
3.	Incorrect entry into moving traffic	9.6%
4.	Failure to heed traffic signals	8.9%
5.	Error in interaction with pedestrians	8.7%

This compilation shows clearly that bicyclists were either not using an available sidepath, or were riding in the wrong direction on it, in one third of the crashes they caused. It is important to note that this cause was only recorded if the sidepath could be used without impediment, or in the correct direction. But also, merging into moving traffic (from the edge of the roadway, from the sidewalk onto the roadway etc.) is an important cause of crashes.

In addition, table 39 shows that average age of bicyclists for each cause of crashes. Various causes appear to be related to particular ages. The cause "alcohol" corresponds to an age of just over 40 years, while the failure to heed traffic signals (running red lights) corresponds to an age of 26.6 years. The value for the cause "error in entering moving traffic" is even lower at 23.3 years. The relatively low average age for this cause implicates young bicyclists' lack of experience in street traffic. Note that the average age of all bicyclists involved in crashes in 1985 was 27.9 years. 

4.1.5 Other persons involved in bicycle crashes in streets with sidepaths

Table 40 shows the categories of other persons involved in crashes with bicyclists on streets with sidepaths in 1985.

Drivers of passenger cars were 65% of these, and pedestrians were 10.4%. Other bicyclists were 5.4%, accounting for 89 crashes.

1,057 crashes, 63.8% of crashes on streets with sidepaths, occurred at intersections. At intersections, drivers of passenger cars were 72.8% of the other persons involved, a somewhat higher rate than the 65% for all locations on streets with sidepaths. Pedestrians accounted only for 7.4%, or 78, of the other persons involved in crashes at intersections.

The values between intersections were somewhat different. Among the 601 crashes (36.2% of all those on streets with sidepaths), drivers of passenger cars were only slightly more than half of the other persons involved (51.2%). 15.6%, on the other hand, were pedestrians, a percentage more than twice the 7.4% at intersections. However, it is important to consider the location of crashes at intersections. Of the 94 bicycle crashes involving pedestrians between intersections on streets with sidepaths, 9, or 9.6%, occurred on the

sidewalk, 82, or 87.2% on the sidepath and 3 on the roadway. The sidepath has a similar, high rate in crashes involving passenger cars. Of the 308 car-bike crashes, 19, or 6.2%, occurred on the sidewalk, 238, or 77.3% on the sidepath and 51, or 16.6%, on the roadway.

There were 35 crashes on the sidewalk, involving 9 pedestrians (25.7%), 2 other bicyclists, (5.7%) and 19 drivers of passenger cars (54.3%). Of the 495 crashes on the sidepath, pedestrians were involved in 82 (16.6%), other bicyclists in 46 (9.3%) and drivers of passenger cars in 238 (48.1%).

Among the 1,658 bicycle crashes on streets with sidepaths, 163 (9.8%) involved no other person. These "single-person" crashes included 60 (36.8%) at intersections and 103 (63.2%) between intersections. 93 of the 163 single-person crashes occurred on the sidepath.

4.1.5.1 Severity of bicycle crashes in relation to other person involved

Table 41 shows the average severity of bicycle crashes in 1985 on streets with sidepaths, organized according to the category of the other person involved.

On streets with sidepaths, bicycle crashes have an average severity of 12.2, according to the severity index described in section 1.1.2. Distinct

differences can be seen if the crashes are divided up according to the category of the other person involved. Passenger car-bicycle crashes have an average severity of 9.52, bicyclist-bicyclist crashes, a value of 16.88, and bicyclist-pedestrian crashes, a value of 14.59. Crashes involving trucks also have a high severity index, 16.87. The highest value of all is that of bicyclists alone, that is, without involvement of any other person, at 22.66.

The average severity for the different types of persons involved must also be considered in connection with the location; severity at intersections differs noticeably from severity between them. Car-bicycle collisions have a value of 5.85 between intersections (with 308 crashes). At intersections, on the other hand, the value is 10.98, with 770 crashes. Similarly distinct differences occur with bicycle-bicycle collisions, with a value of 12.72 at intersections (with 39 crashes) and 20.12 between intersections (with 50 crashes). The differences are not as marked with bicycle-pedestrian crashes, 13.91 at intersections (with 78 crashes) and 15.16 between intersections (with 94 crashes).

Categorizing crashes between intersections according to the location shows that crashes on the sidewalk pose no problem, at least not for pedestrians. Among the only 9 crashes between bicyclists and pedestrians, the average severity is only 5.0. Crashes on the sidepath are more significant: the severity was 16.65 with 82 crashes; for bicycle-bicycle crashes, it was 18.61, with 46 crashes.

4.1.5.2 Causes by other persons on streets with sidepaths

Table 42 lists the causes related to other persons in crashes in 1985.

In the order of frequency, the most common causes are:

1.	Error when turning, and specifically		48.9%
	Left turn with traffic from the opposite direction	9.7%	
	Right turn	33.4%	
	Other left turns	5.6%	
2.	Entry into moving traffic		9.7%
3.	Failure to heed signs requiring yielding		6.5%
4.	Pedestrians crossing the roadway without paying attention to traffic		6.5%
5.	Error when getting in or out (opening door without paying attention)		3.1%

The remaining causes related to other persons account for smaller percentages. All in all, other persons are identified as causing 66.2% of crashes on streets with sidepaths (1,098 of 1, 658 crashes); of these, pedestrians are identified as causing 127 crashes, or 7.7%, and are 11.6% of the other persons identified as causing crashes.

4.1.6 Crashes involving bicyclists and trucks on streets with sidepaths

Table 43 shows severities for bicyclists of crashes involving trucks on streets with sidepaths in 1983 and 1985.

The total number of bicycle-truck crashes in Berlin increased from 70 in 1983 to 99 in 1985, and the number of bicyclists injured increased from 51 to 88 (+72.5%). The marked increase is primarily due to the increase in the number of slightly-injured bicyclists, for whom the increase was 108.6%.

In 1985, 171 crashes involving trucks (with and without trailers) were recorded, and 99, or 57.9% of these, occurred on streets with sidepaths. 88 of a total of 149 injuries to bicyclists in such crashes occurred on these streets.

Most, 75 of 99, or 75.8%, of bicycle-truck crashes on streets with sidepaths occurred at intersections (see table 44).

The most important cause of bicycle-truck crashes at intersections was incorrect right turns by the truck drivers. These accounted for 63, or 36.8%, of the 171 bicycle-truck crashes, but 57, or 57.6%, of the 99 which occurred on streets with sidepaths, and 42, or 56.0%, of the 75 crashes at

intersections on these streets. The 42 crashes at intersections correspond to a percentage of 66.7% for this cause on all streets with sidepaths (see Table 45).

4.2 Bicycle crashes on streets without sidepaths

4.2.1 Crashes categorized by severity

Table 46 shows trends in bicycle crashes on streets without sidepaths from 1983 to 1985.

Although there was a very minor increase of 0.1% in all bicycle crashes, the trend on streets without sidepaths was one of very significant decline. There were 2,234 crashes in 1983 on such streets, and 1,854 in 1985, a decrease of 17.0%. Among these crashes, the percentage resulting in injury remained almost constant, 75.4% in 1983 and 76.5% in 1985, all though the absolute number for such crashes declined by 15.9%, from 1,686 in 1983 to 1,418 in 1985. The clearest decline was in crashes resulting in serious injury. There were 244 such crashes in 1983 and only 180 in 1985, a decline of -26.2%.

As the data described identify crashes according to their most serious consequence, a similar, in some ways even more pronounced, decline for the bicyclists can be discerned. Bodily injuries declined by 14.4%, from 1.512

recorded in 1983 to 1,294 in 1985. The decline by -24.4% in the number of seriously-injured bicyclists is especially notable.

Bicyclists were injured in 67.8% of the reported crashes in 1983, and this percentage rose only slightly, to 69.6% in 1985.

There was also a significant decline, 29.8%, in crashes resulting only in property damage from 1983 to 1985.

It is also noteworthy that the bicyclist suffered no loss whatever in a large number of crashes. However, the percentages of such crashes declined from 1983 to 1985. In 1983, 17.4% of crashes on streets without sidepaths resulted in no loss, but in 1985, the percentage was only 14.1%. The absolute number also declined from 1983 to 1985, by -32.9%.

4.2.2 Bicycle crashes categorized by location

Table 48 categorizes crashes on streets without sidepaths according to the type of location.

While all bicycle crashes only increased by an insignificant +0.1% from 1983 to 1985, those on streets without sidepaths decreased by 17.0%. The number of crashes between intersections decreased most markedly, by 31.5%, from 1,225 to 839. Crashes at intersections decreased only slightly, by -2.9%.

However, the trend in the percentage of crashes at intersections is opposite that between intersections. The percentage of crashes at intersections rose from 44.0% to 51.5% (increase of 7.5%). Crashes between intersections were 54.8% in 1983, but had decreased to 45.3% in 1985 (decrease of 9.5%).

Not only the absolute numbers of crashes at and between intersections on streets without sidepaths decreased, but also their average severity. While the average severity of all bicycle crashes decreased by -3.0% (see table 49) between 1983 and 1985, the decrease on streets without sidepaths was a full 7.2%. Crashes between intersections had the most pronounced decrease, -11.6%. Crashes at intersections decreased by -6.3%.

Though the severity of the crashes decreased both between and at intersections, the severity at intersections was greater, and the difference also increased, from 1.1 in 1983 to 1.62 in 1985.

4.2.3 Bicycle crashes between intersections categorized by location of collision

Table 50 shows the distribution of bicycle crashes between intersections on streets without sidepaths in 1983 and 1985, categorized according to the location of the point of collision in the cross-section of the street.

The number of crashes between intersections decreased -31.5%, from 1,225 in 193 to 839 in 1985. Crashes on the roadway decreased by -30.6%, from 889 in 1983 to 617 in 1985; those on the sidewalk, by 30.4%, from 263 in 1983 to 183 in 1985. (On streets with sidepaths, on the other hand, there were 33 crashes on sidewalks in 1983 and 35 in 1985).

The relative percentage of these two types of collision locations hardly changed between these two years. Between intersections, crashes on the roadway were 73.5 of the total on streets without sidepaths in 1983, and crashes on the sidewalk were 21.8%. It is notable that 81 of the 183 crashes in 1985 on the sidewalk occurred near or at driveways; these are 44.3% of all crashes on the sidewalk, nearly on in two.

Table 51 gives the average severity for crashes on streets without sidepaths. The average severity for crashes on the roadway decreased by 12.7%, from 11.21 in 1983 to 9.79 in 1985. The average severity for crashes on the sidewalk, on the other hand, increased slightly, by 3.6%, from 9.73 to 10.09.

4.2.4 Causes of bicycle crashes on streets without sidepaths

Table 52 shows the causes of crashes on streets without sidepaths in 1985.

The most common ones are, in order of frequency:

1.	Use of the wrong part of the roadway, or use of another part of the street corridor contrary to law	19.2%
2.	Incorrect safety distance (especially, lateral)	16.9%
3.	Error when getting in or out, loading or unloading (opening door without paying attention)	10.5%
4.	Inappropriate speed	10.0%
5.	Entry into moving traffic	7.5%

Here again, the individual causes of crashes are of different importance between intersections and at intersections. The highest percentage between intersections was for use of use of the wrong part of the street corridor (as a rule, illegal riding on the sidewalk), at 24.8%, that is, one crash in four. At intersections, on the other hand, the highest percentage is insufficient safety distance, with 14.8%. Also significant at intersections, however, are errors when turning, together amounting to 24.9%. Left turns with traffic in the opposite direction had the highest percentage among these, and errors when turning right amounted to 8.5%.

4.2.4.1 Severity as related to particular causes of crashes

Table 53 gives the severity of crashes with particular causes on streets without sidepaths in 1985.

The average severity was10.78. Inappropriate speed had the highest average value, at 19.3, and it was highest at intersections (18.5) as well as between intersections (19.2). It can be seen that crashes involving cross-traffic had a particularly high severity at intersections. This is especially the case when the cause relates to yielding rules. Failure to obey the rule of priority of right over left leads to an average severity of 10.8 (average at intersections: 11.40), failure to heed traffic signals requiring yielding, to a value of 14.2, and failure to obey traffic signals, to a value of 14.3.

At intersections of streets without sidepaths, errors when turning left have a severity of 11.6, but other errors in turning have a value below the average for the intersections -- particularly, right-turning errors have a severity of 8.0.

4.2.4.2 Bicyclists' causes

Table 54 shows how bicyclists caused crashes on streets without sidepaths.

The highest percentage, at 24.9%, was for use of the wrong part of the street corridor; next were insufficient safety distance (particularly, lateral clearance) at 20.8%, and inappropriate speed at 12.8%

"Error in entering into moving traffic" accounts for 11.7%, and the other causes have significantly lower shares.

All in all, it can be seen that bicyclists caused or contributed to the causation of 63.8%, 1,183 of the 1,854 crashes on streets without sidepaths.

The average age of bicyclists for the individual causes differs on these streets as on the others. The average age for the cause "alcohol" is 38.6 years, and for "error with respect to pedestrians", it is 15.9 years. The cause "Entry into moving traffic" also has a very low average age of 17.7 years. The absolute number is 139 bicyclists for these two causes, and they show a very high involvement of much younger bicyclists (see also the data on the  eral crash involvement of younger bicyclists in table 19).

4.2.5 Other persons involved in bicycle crashes on streets without sidepaths

Table 55 shows the different categories of other people involved in bicycle crashes on streets without sidepaths in 1985.

71.5% of these crashes involved passenger cars. In 1985, crashes involving pedestrians were 7.0% and crashes involving trucks were 3.9%. Crashes involving only the one bicyclist were 10.1%, 187 out of the 1,854 crashes.

Passenger cars are, obviously, most commonly involved, but "only" in 67.8% of crashes between intersections; 77.0% at intersections. Pedestrians were involved in 4.4%, 42 crashes at intersections, and in 8.8%, 74 between intersections. The highest percentage of involvement for pedestrians was in crashes between intersections on the sidewalk, 17.5% (32 of 183 crashes on the sidewalk). Passenger cars were involved in 735 crashes at intersections (55.5% of car-bicycle collisions), and in 569 (42.9%) between intersections. Pedestrians, on the other hand, were more often involved between intersections, with 74 crashes (56.9% of 130 bicycle-pedestrian crashes); 42 bicycle-pedestrian crashes, 32.3% of the total, occurred at intersections.

4.2.5.1 Severity of bicycle crashes depending on other person involved

Table 56 shows the average severity of crashes on streets without sidepaths, categorized according to the involvement of other persons.

The highest average severity on streets without sidepaths occurred in crashes involving pedestrians, with a value of 17.40 (average severity of all crashes on streets without sidepaths was 10.78). Crashes involving trucks had a severity of 15.21, and crashes involving passenger cars had a value of 8.64, lower than the average on streets without sidepaths.

At intersections, the average severity of bicycle-pedestrian crashes was at its highest, 24.91; the highest value for crashes between intersections was for those with trucks, at 17.40.

The very high value for crashes between intersections with miscellaneous, or unknown other persons, may be neglected, as the numbers of crashes were very low.

For crashes between intersections on the sidewalk (average severity of 10.08), only those involving pedestrians had a severity value above the average. There were 32 bicycle-pedestrian crashes, with a value of 15.16, out of the 183 crashes on sidewalks.

The 187 crashes involving only the bicyclist reached high severity levels on streets without sidepaths as well. The severity level for all of these crashes was 19.56; for the 23 on sidewalks, the value was highest, at 24.61.

4.2.5.2 Causes by other persons on streets without sidepaths

Table 57 shows the causes of bicycle crashes by other persons in 1985 on streets without sidepaths.

46.0%, 853 of the 1,854 crashes on streets without sidepaths in 1985 were entirely or partially caused by another person.

The main causes by other persons, in the order of frequency, were:

1.	Error when getting in or out of a vehicle (inattention when opening door)		22.7%
2.	Error when turning, and of these:		21.9%
	-- Error when turning right	11.0%	
	-- Error when turning left with traffic from the opposite direction	6.3%	
	-- Other error when turning left	4.6%	
3.	Entry into moving traffic		14.7%
4.	Failure to heed signs requiring yielding		7.3%

The four causes in this incomplete list are responsible for more than 66% of crashes caused by other persons.

The pedestrian was recorded as causing 43 of the 130 bicycle-pedestrian crashes on streets without sidepaths in 1985. The most common cause in this case was "crossing the roadway without paying attention to traffic", accounting for 2.5% of all causation by other persons.

4.2.6 Bicycle-truck crashes on streets without sidepaths

Table 58 categorizes bicycle crashes involving trucks in 1983 and 1985 according to the severity for the bicyclists.

On streets without sidepaths, the number of crashes involving trucks decreased from 107 in 1983 to 72 in 1985, or by -32.7%. The number of injured bicyclists went down from 95 in 1983 to 61 in 1985, or by 35.8%. The rate of bodily injury in such crashes therefore went down from 88.8% in 1983 to 84.7% in 1985.

Of the 72 crashes involving trucks on streets without sidepaths, 37, or 51.4%, occurred at intersections; fortunately, these included no fatalities. Exactly 50% of the injuries to bicyclists occurred at intersections: 5 severe and 25 light injuries (see table 59).

5 Bicycle crashes categorized by districts, overview

Table 60 shows differences in numbers and percentages of bicycle crashes by district for the years 1983 and 1985.

It can be seen that bicycle crashes are not evenly distributed throughout the city.

The districts are listed below in the order of the number of bicycle crashes in 1985:

District	Bicycle crashes	
	number	percentage
Charlottenburg	433	12.3%
Spandau	365	10.4%
Reinickendorf	355	10.1%
Neukölln	333	9.5%
Wilmersdorf	317	9.0%
Tempelhof	308	8.8%
Steglitz	270	7.7%
Zehlendorf	255	7.3%
Kreuzberg	247	7.0%
Tiergarten	229	6.5%
Schöneberg	229	6.5%
Wedding	171	4.9%

There could be many reasons for the crashes' ranging from 4.9% to 12.3% in the different districts. Especially important ones are the size of the districts, the length of their street networks, and the volume and density of traffic in general and of bicycle traffic.

5.1 Overview of bicycle crashes in each district

Tables 61 through 72 show the number of bicycle crashes in each district for the years 1983 and 1985 in detail.

For that reason, only particularly striking situations in the individual districts are mentioned here:

Reinickendorf

(see table 61)

Though there was only a weak increase in the number of bicycle crashes of +1.1% overall, there was a very notable increase in those at intersections of 28.6. The crashes in streets without sidepaths increased very markedly by +40.8%, and at especially on those streets at intersections, by +58.9%.

Wedding

(see Table 62)

Though bicycle crashes as a whole decreased by -8.1% in Wedding, the change on streets with and without sidepaths was precisely opposite: on streets without sidepaths, crashes decreased by -25.0%, and in streets with sidepaths, they increased by +25.8%; and in those streets at intersections, even more so, at +36.1%.

Spandau

(see table 63)

Spandau had 10.4% of all Berlin bicycle crashes in 1985 in 1985, declining in numbers by -11.8% compared with 1983. The decrease in streets without sidepaths was particularly marked at -41.6%. However, the number of crashes in streets with sidepaths increased by 25.7%, and at intersections on those streets, by 40.4%.

Wilmersdorf

(see table 64)

This district had an overall increase of +18.3% in bicycle crashes, which primarily is due to an increase of +42.1% in crashes in streets with sidepaths.

Charlottenburg

(see table 65)

Although Charlottenburg had the highest percentage of bicycle crashes in 1985, there was a decrease of -4.6% compared with 1983. The decrease resulted, however, only from the change in streets without sidepaths; in streets with sidepaths, there was an increase of +15.6%; at intersections on these streets, the increase was +45.9%.

Tiergarten

(see table 66)

Tiergarten has a decrease of -2.6% overall in bicycle crashes, though crashes at intersections increased significantly, by 26.4%, due primarily to an increase of 60.3% in crashes at intersections in streets with sidepaths.

Zehlendorf

(see table 67)

Bicycle crashes all in all decreased by 2.7%, primarily due to changes in streets without sidepaths (decrease of -19.8%). However, crashes in streets with sidepaths increased, and particularly so at intersections, where they increased by +31.0%.

Steglitz

(see Table 68)

Developments in Steglitz are similar to those in the other districts already described, with a decrease of -5.3% in all bicycle crashes, but an increase in those at intersections. Crashes in streets without sidepaths decreased from 1983 to 1985, but those in streets with sidepaths increased by 11.4%, and among those, increases at intersections, by 30.8%.

Schöneberg

(see table 69)

Schöneberg had a slight increase of 4.6% in bicycle crashes, but those at intersections increased by an especially large amount, 32.5%. While the crashes in streets without sidepaths decreased, those in streets with sidepaths showed a rising tendency, especially at intersections, where the 113.8% increase was especially notable, though the absolute numbers for this were small and must be regarded with caution.

Tempelhof

(see table 70)

Tempelhof had a distinct increase in bicycle crashes from 1983 to 1985; the increase of 100% in streets with sidepaths was especially marked, at 100%. In this connection, it must be noted that approximately two thirds of the bicycle crashes occurred on streets without sidepaths. However, the crashes at intersections on streets with sidepaths were especially notable with an increase of +209.1%. Still, the relatively low absolute numbers should not be ignored.

Neukölln

(see table 71)

The number of bicycle crashes in Neukölln remained nearly the same, but there was a significant increase in those at intersections. Crashes in streets without sidepaths decreased between 1983 and 1985, while those on streets with sidepaths increased significantly -- in total, in crashes at intersections and in crashes between intersections.

Kreuzberg

(see table 72)

The number of crashes remained almost the same in Kreuzberg as well between 1983 and 1985; crashes at intersections increased by +23.7%, while those between intersections decreased by almost the same amount. Just as in other districts, the number of crashes in streets without sidepaths decreased, while that in streets with sidepaths increased relatively.

5.2 Bicycle crashes on streets with sidepaths, by district

Table 73 shows that pattern of bicycle crashes in streets with sidepaths in the individual districts, accounting for the lengths of the sidepath networks.

This comparison also reveals considerable differences, whose causes were to be investigated.

The following list shows bicycle crashes per km of streets with sidepaths, in order of frequency.

District	Bicycle crashes per km of streets with sidepaths	
Kreuzberg	5.30	crashes/km
Tiergarten	5.05	crashes/km
Charlottenburg	4.99	crashes/km
Schöneberg	4.83	crashes/km
Wedding	4.19	crashes/km
Wilmersdorf	4.17	crashes/km
Steglitz	3.55	crashes/km
Tempelhof	3.4	crashes/km
Spandau	3.16	crashes/km
Neukölln	2.73	crashes/km
Reinickendorf	2.24	crashes/km
Zehlendorf	2.20	crashes/km

While Kreuzberg had the highest number of crashes per km of sidepath, 5.3, Zehlendorf had the lowest, at 2.0.

Although the Spandau district had the largest number of crashes on streets with sidepaths, the number per km was below the city average of 3.32 per km. Eight of the 12 districts were above the city-wide average. It can also be seen that the number of crashes per km of sidepaths is greater, the shorter the sidepath network in a given district. So, for example, Schöneberg, with 16.36 km, had 4.83 crashes per km, and Zehlendorf, with the longest

sidepath network of 83.11 km in 1985, had only 2 crashes per km. The absolute number in streets with sidepaths in Schöneberg was 79, and in Zehlendorf, it was 166.

The data about the number of crashes and the length of the sidepath network are insufficient for the purpose of precisely evaluating the situation on streets with sidepaths; rather, additional parameters, for example, the volume of bicycle traffic, or the distance traveled by bicyclists in these localities, must be examined as well. These data were not available for purposes of this investigation.