PSYCHOLOGICAL DISORDERS IN AIR FORCE PERSONNEL

H. C. Ganguli
Air Headquarters, New Delhi

ABSTRACT

Importance of the problem—Nature of flying stress—Rate of incidence of psychological disorders—Comparison of air force and industrial incidence rates—Reaction types—Neurosis and nature of work—Some factors related to psychological breakdown—Prognosis—Concluding remarks—References.

INTRODUCTION

Importance of the Problem

Psychological disorders occupy a prominent place as a cause for invalidation from air forces. This is true both for flying and non-flying crews and in war as well as peacetime. For example, during the period February 1942 to February 1943 the R.A.F. aircrew had, on the average, 3·2 cases of neurosis due to flying stress for every 100 man-years. This meant that amongst 100 flying crew serving in a R.A.F. Station for a period of one year, slightly more than 3 persons tended to develop neurosis. In the final disposal, only 29·5 per cent of these cases were allowed full flying, the majority (60·5 per cent) being allotted ground duties and 1·1 percent invalidated out (Symonds in Air Ministry—1947; p. 167). In the U.S. Eighth Air Force between August 1942 and April 1945, 1716 cases were examined by the Central Medical Board and three-fourths of these were classed as emotional disorders and only one-fourth as cases of physical disability. In the Indian Air Force during the ten years of peace, 1950—59, 27·8 per cent of all invalidation has been due to psychological disorders, both psychosis and neurosis. In one particular year, psychological disorders have accounted for more than half of the total invalidation. Amongst aircrew only, nearly one-sixth of all invalidation has been due to psychological disorders. Incidence of psychological disorders in the I.A.F. is more than that due to malaria and more than double that due to tuberculosis.

Pilots of civil airlines suffer from similar psychological disorders; however, their rate of incidence and intensity of symptoms are less than that in military fliers. Also, the major mental disorders like schizophrenia and manic depressive insanity are not frequently encountered in civil aircrew. In an analysis of 232 problem medical cases of airline pilots McFarland (1953; p. 225) found that 58 pilots or 25 per cent of the group were suffering from functional disorders. The frequencies of occurrence were: psychoneurosis—32 cases or 55·2 per cent of the functionally ill; psychosis—4 or 6·9 per cent; emotional instability—12 or 20·7 per cent. 24 of these 58 pilots (41·4 per cent) were permanently grounded and another 41·4 per cent were temporarily grounded.

It is thus seen from the above figures that psychological disorders play an important role in the invalidating or grounding of flying personnel both in peace and war, in military as well as in non-military flying. Incidence rate of psychological disorders is not very high in peace time; for example, the I.A.F. rate is less than 2 per thousand per year. However,

in actual combat conditions this can jump up to 120 per thousand for specific flying crews like those in the Bombers. Therefore, certain aspects of this problem deserve study in peacetime. The minimum acceptable neurotic predisposition at the time of selection of aircrew, availability of trained psychiatrists and clinical psychologists, role played by factors like squadron morale as a protection against psychological breakdown etc. are some of the important problems in this context and need investigation. Only then a certain preparedness can exist to treat and perhaps to reduce also the large number of cases that may be expected to come up under combat conditions.

Nature of Flying Stress

The demands made on the pilot for the act of flying are massive. These are both physical and psychological. Perhaps the greatest single threat in flying is danger to life or injury to limbs. This danger is relative to many factors like the nature of flying, type of aircraft, maintenance, skill and experience of the aircrew and so on. It can be said that fear constitutes a major and the most important psychological stress in flying. Following this are other factors like physical discomfort (cold, changes in pressure, motion sickness, cramped position in the cockpit etc.) and demands on energy for movements of control and for maintenance of a high degree of "persistence, vigilance, accuracy, decisiveness, self-control and presence of mind".

Passivity during flight is another source of stress. Ability and opportunity to maintain an active role is a protection against psychological breakdown. It was noted in the last war that the comparatively inactive members of a flying crew like the Air Gunner are more susceptible to psychological breakdown than the navigator or pilot. In very high altitude flight when the earth becomes almost invisible through its surrounding haze, there very often develops a feeling of profound loneliness and mental depression. In space flight, in addition to these, might be added the problem of sensory deprivation and loss of perceptual contact with the world. It is believed that such deprivation leads to an intense desire for extrinsic sensory stimulation, increased suggestibility, impairment of organised thinking, depression and in some cases to hallucination, delusion and confusion.

In the years following the First World War, there was a tendency to use the term flying stress as synonymous with symptoms induced by stress or strain in flying; that is, as syndromes instead of causes of these. At a later stage the syndromes came to be given new names like ærosthenia and æroneurosis and 'flying stress' was used as a synonym for these. Both these developments have, however, been repudiated now. The various psychological and psychiatric symptoms developed by aircrew are now covered by the standard nomenclature like anxiety neurosis, hysteria, obsessional reaction, schizophrenia etc. The term flying stress, on the other hand, is now utilized to indicate the causes of these symptoms; as something that is happening to the person in the course of his flying activities and not for something that is happening within him as a result of the interaction of the peculiar environmental factors and his own predisposition.

Rate of Incidence of Psychological Disorders

Overall incidence figures of mental disorders in the air forces are not readily available. Firstly, security reasons prevent air forces from disclosing the strength of their personnel

and the incidence rates. Some incidence data are released but these are usually for periods fairly in the past. For example, the R.A.F. has published some wartime figures but one does not know to what extent conclusions from these hold valid today. Secondly, the diagnosis and classification of the symptoms as falling under a particular psychiatric category is a very unsatisfactory process. For example, Bond (1952; p. 183), while discussing the cases dealt with by the U.S. Eighth Air Force Central Medical Board, writes: "In a special report prepared by Major Burchell, it was stated that the emphasis placed upon structural defects was too great and that an internist would have tended to classify a fair proportion of those here classed as physical disability into the emotional category". This tendency on the part of the medical authorities is due to several factors, chief amongst these being the social stigma accompanying classification as a 'mental' case, sometimes unfavourable retirement and other benefits for psychiatric as compared to organic cases and lastly, in a few instances also due to the examining medical man's ignorance of psychiatry or clinical psychology.

Very detailed analysis of R.A.F. figures during World War II have been published (Air Ministry—1947). During the year ending February 1943, 2200 cases of 'neuroses arising mainly from flying duties' were referred to neuro-psychiatrists. The decision whether or not a neurosis was caused by flying duties was made by the physician on the basis of his interview with the subject and his clinical judgment. Incidence rate of neurosis in the unit has been calculated per 100 man-years. Man-years in the unit for a period is the sum of individuals in the unit multiplied by the duration of stay of each of them in the unit during this period. "It was subsequently found that incidence expressed as per cent man-years was roughly the same as.....per cent average strength" (p. 141).

The R.A.F. data showed that the incidence of neurosis per 100 man-years for all categories of flying crew was 3·2. Roughly, this meant that 3·2 persons out of every hundred R.A.F. flying crew suffered from different types of neurosis which were directly related to their flying duties. In addition, there were 303 cases of 'neurosis not directly caused by flying duties' and 416 cases of 'No neurosis, but lacking in confidence'. These are equivalent to incidence rates of 0·44 and 0·61 respectively per 100 man-years. Thus, the overall incidence rate of neurosis in R.A.F. flying personnel due to flying as well as non-flying causes (like domestic worries in overseas married personnel) was 3·64 per 100 man-years or 3·64 per 100 persons in an year.

Actual incidence figures for the American Air Force in World War II are not available to us. However, that the problem was serious enough can be gauged from indirect evidence. For example, Hastings *et al.* (in Mebane—1961; p. 455) in a study of successful aircrew members in the U.S. Eighth Air Force in World War II observed that: (*i*) tension and anxiety were universal; (*ii*) 95 per cent of the men developed definite 'stress reactions' and 34 per cent suffered severely. Burchell and Bond in a study of 100 successful aircrew of the Eighth Air Force found that "43 out of 100 showed more than slight symptoms of anxiety" (Bond—1952; p. 133). The Central Medical Board of the same Air Force examined 1716 cases between August 1942 and April 1945. Three-fourths of these were classed as emotional disorders and one-fourth as physical disability, indicating thereby the substantial incapacitating role played by psychological disorders.

The Indian Air Force record of mental disorders follows the World Health Organisation classification of psychological disorders; it feels that the emotional disorders of fliers can

be adequately covered by the usual psychiatric disease categories and do not need any special terms. The mean annual incidence rate of mental disorders, psychosis, neurosis and character disorders, for I.A.F. officers in the last nine years has been 1·73 per thousand individuals, the range being 1·13 to 3·09. This cadre of officers include ground duty officers and the entire flying crew of the I.A.F. In I.A.F. flying crew only, the annual incidence rate of psychological disorders has been of the order of two per thousand. In a typical year, the detailed incidence rates per thousand were as follows: psychosis—0·35; neurosis—1·75; and miscellaneous character disorders—0·71. In other words, psychosis rate was one-fifth and character disorders one-half of neurotic disorders. It may be reiterated that these are peacetime figures. In combat conditions, due to increase in operational hazard, the figures are likely to be much higher.

Comparison of Air Force and Industrial Incidence Rates

It might be interesting to know how mental disorder rates in the air force compare with those in civilian life. R.A.F. results can be compared with Fraser's (1947) findings on incidence of neurosis in British factory workers during the period 1944-46. Fraser studied 3,000 workers from a total of 30,000 employees in medium and light engineering industries. He found that 10 per cent of this population (9·1 per cent of male and 13·0 per cent of female subjects) suffered from 'definite neurosis'. Another 20 per cent (19·2 per cent men and 23 per cent women) had minor forms of neurosis.

It may be noted that the 10 per cent incidence rate given by Fraser is more than three times the overall R.A.F. rate of 3·2 per cent. There is a possibility that the term neurosis has been interpreted by Fraser more broadly than by the R.A.F.; there is no way of knowing this. If need for psychiatric treatment is a criterion (which was the case in the R.A.F.), then Leonard Himler's study (in Mindus) might be quoted where he found that 3·5 per cent of the industrial population have emotional problems serious enough to need specific treatment by a psychiatrist and 1·5 per cent need hospitalisation. Himler's figure of 3·5 per cent is comparable to the wartime R.A.F. figure of 3·2 per cent.

In India a study on industrial neurosis under the present author, sponsored by the Indian Council of Medical Research, is under progress; pending this, the only existing industrial data, on the basis of study of very small samples by the present author, indicate that "12 per cent of industrial workers and 13 per cent of industrial managers as compared to about 15 per cent of students can be regarded as suffering from some sort of neurosis." (Ganguli—1962). However, the Contributory Health Service Scheme of the Government of India covers nearly half a million government employees of Delhi and New Delhi. In 1960, 120 persons from the above Delhi population were diagnosed by psychiatrists as cases of psycho-neurosis (Ministry of Health—1961). The incidence rate thus comes to 0·27 per thousand. Since the psychoneurosis rate for all I.A.F. personnel is 1·80, it is nearly seven times higher than the Delhi civil population. However, since the C.H.S. data do not include patients who may have sought treatment outside the Scheme (there will not be many like this), the ratio may actually be somewhat lower than one to seven.

The entire I.A.F. psychosis rate of 0·55 per thousand is very similar to the general population psychosis rate in different parts of India, which varies between 0·33 to 0·67 per thousand, with a mean of 0·50/1,000 (Seal *et al.*—1959—62). Comparison of incidence rates in I.A.F. officers (flying or non-flying) with civilians of similar socio-economic status would be interesting but not possible as the latter data are not available.

A summary of figures presented in this and the previous section is given below in Table 1. Extensive generalisations from these values should be avoided; the figures should be regarded only as pointers to the general state of things.

TABLE 1

INCIDENCE RATES OF PSYCHOLOGICAL DISORDERS FOR AIR FORCE AND CIVIL POPULATIONS

Period	Population	Disorder	Rate per thousand
World War II ..	RAF flying personnel	Neurosis from all causes ..	36·0
World War II ..	RAF flying personnel	Neurosis due to flying stress only.	32·0
World War II ..	British industrial population ..	"Definite Neurosis" ..	100·0
Post-War	American industrial population ..	Neurosis needing psychiatric treatment.	35·0
Peace-time ..	General industrial population in western countries.	Psychosis	6·5
Peace-time ..	IAF Officers—flying and ground ..	Neurosis	1·75
Peace-time ..	All IAF personnel	Neurosis	1·80
Peace-time ..	Govt. civilian employees in Delhi ..	Neurosis	0·27
Peace-time ..	IAF Officers—flying and ground ..	Psychosis	0·35
Peace-time ..	All IAF personnel	Psychosis	0·55
Peace-time ..	All India civil population, mostly rural	Psychosis	0·50

Some general conclusions derivable from the above table are given below:—

(*i*) Air Force (all personnel) neurosis figures during peacetime tend to be substantially higher than those of comparable civilian office workers; at the same time, this is lower than the incidence rates in the country's industrial population.

(*ii*) Peacetime incidence rates of psychosis for all air force as well as civilian office personnel are similar (about 0·5 per thousand in India); however, as in the case of neurosis, these figures are substantially below Mindus' estimated psychosis rate of 6·5 per thousand in industries in general.

(*iii*) During war, neurotic (and not so much psychotic) cases in air force flying crew increase due to the enhanced operational hazard and enemy action. This increase in rates of incidence may be very substantial, bearing practically no relation to the low peacetime figures. Since, however, in modern warfare the industrial population is also subjected to aerial bombing and other serious deprivations, incidence rate in the industrial population also keeps pace with flying crew psychiatric casualties.

Reaction Types

Table 2 below gives the breakdown of 2,200 R.A.F. wartime psychiatric cases and 626 I.A.F. (all personnel) peacetime cases.

TABLE 2
PROPORTION OF DIFFERENT REACTION TYPES

	*R.A.F. (N: 2,200)	I.A.F. (N: 626)
Psychosis	0·7%	20·1%
Neurosis	110·6	61·0
Character Disorders	..	13·0
Organic Reactions	0·4	5·9
Mixed Forms	11·1	..

* These figures total to more than hundred because of multiple classification of simple reactions in the neurotic group.

It is evident from Table 2 that neurotic cases account for two-third or more of all psychiatric breakdowns in any air force. The role played by psychotic breakdowns in air forces, however, is not very clear. The R.A.F. value of 0·7% may be compared to Hastings, Wright and Gleuck's (Mebane—1956) figure of 5% of psychotic cases among sixty neuropsychiatric breakdowns in the Eighth Air Force in the last War. The I.A.F. high percentage of psychotic patients relate to all types of personnel and hence not strictly comparable to the preceding figures. In view of the very low R.A.F. psychosis figures, Mebane's opinion that "Psychotic disorders are an infrequent occurrence among fliers" seems to be substantiated.

Table 3 discusses the different reaction types in greater detail.

TABLE 3
DISTRIBUTION OF DIFFERENT REACTION TYPES

	Percentage of Cases	
	R.A.F. (2,200)	I.A.F. (626)
Anxiety state	79·1	44·5
Hysteria	12·8	7·8
Phobic Reaction	..	0·2
Obsessional Reaction	2·2	0·3
Neurotic Depression	9·6	3·4
Neurasthenia (fatigue state)	6·9	..
Psycho-neurosis (mixed forms)	11·1	4·8
Schizophrenia	0·4	11·0
Manic Depressive Reaction	0·3	4·0
Paranoia	..	0·8
Psychosis (mixed forms)	..	4·3
Organic Reaction	0·4	5·9
Character Disorders	—	13·0

Several points may be noted from the above table. Anxiety reactions, hysteria and neurotic depressions are the three most frequently noted syndromes, in that order of importance, encountered amongst air force personnel. Obsessional reactions are negligible

in number though cases of neurasthenia characterized by chronic fatigue is not infrequent in wartime conditions. In the psychotic group, schizophrenia seems to be the major category.

Much has been written on the two important syndromes in the air forces, namely, anxiety reactions and schizophrenic reactions. Battle stress, whether on the ground or in the air, is most prone to the development of anxiety reactions. For example, Cooper and Sinclair noted 64% of anxiety cases in neurotic casualties amongst army personnel, whereas Love in Tobruk found anxiety cases with or without hysteria in over 90%. To some extent the higher percentage of anxiety reactions amongst service personnel exposed to operational hazard is understandable since the major mental symptom of this reaction is "fear of all kinds" (Henderson and Gillespie—1956; p. 171) and such fears are evoked more readily in the "battle zone than behind it and in the air than on the ground". It may also be remembered that anxiety reactions are, in general, the commonest form of all the psychoneuroses.

Mebane (1956) gives an analysis of 77 cases of functional psychosis in the U. S. Air Force during January 1951 to November 1954 (Table 4). He found that 86% of these psychotic cases were suffering from schizophrenic disorders of various types.

TABLE 4

DISTRIBUTION OF FUNCTIONAL PSYCHOSES IN THE U. S. AIR FORCE (N=77)

Diagnosis	Per cent
Schizophrenia—paranoid	52·0
Schizophrenia—unclassified	16·0
Schizophrenia—latent	10·4
Schizophrenia—simple	3·9
Schizophrenia—catatonic	3·9
Psychotic Depressive Reaction	5·2
Manic Depressive Psychosis	2·6
Involutional Melancholia	2·6
Paranoid state	3·9

In U. S. naval neuropsychiatric population, the proportion of schizophrenia of all types were found to be 94·5%; nearly half of these, as in Mebane's cases, were of the paranoid form. It may be concluded from the I.A.F., U. S.A.F. and R.A.F. data that half or more of functional psychosis in the air forces belong to the schizophrenic group, thus making it the most important disease category.

An analysis of causes of these breakdowns nearly always shows that the main cause are psychological in nature; of these again, fear is the most important factor. Othe sources of flying stress like airsickness, exhaustion and fatigue, physical injury, illness etc. play minor and subsidiary roles.

Neurosis And Nature of Work

Last war data show some distinct trends regarding relation between psychological breakdown and nature of duties. Table 5 below gives Command-wise figures for the R.A.F. during the period 1942-43 (from Air Ministry—1947; p. 147).

TABLE 5

INCIDENCE OF NEUROSIS PER HUNDRED MAN-YEARS IN DIFFERENT R.A.F. COMMANDS

Command	Under training	On operation	Whole command
Bomber	2·7	12·0	6·5
Fighter	2·5	5·0	4·0
Army Co-operation	1·8	5·4	3·5
Coastal	..	..	3·9
Flying Training	1·1	..	1·3

Several conclusions are derivable from Table 5.

(*i*) Bomber crew rate of neurotic breakdowns, on the whole, are significantly more than that of the fighter crew or for crew in any other Command.

(*ii*) Since the bombardiers have rates similar to the fighters while under training, the higher rate of the former under operational condition can only be due to their peculiar nature and condition of work. Further analysis of these figures show the following rates of incidence:—

Night bombers	12·1/100
Day bombers	11·2
Day fighters	6·0
Night fighters	3·4

Thus the incidence rates follow a definite pattern. The different duties can be arranged, in order of decreasing susceptibility to psychological breakdown as follows: night bombers, day bombers, day fighters, night fighters, basic flying training pupils and instructors. As will be seen later, the danger accompanying the tasks is responsible for this heirarchical arrangement.

Incidence rates in different crew categories for the whole R.A.F. were as follows:

Air Gunner	5·2/100 man-years
W. Op./A. G.	4·4
Pilot	2·8
Navigator	2·8
All categories	3·2

The major factor in the higher incidence rates amongst Air-Gunners and Wireless Operators was the comparative inactivity of the individuals occupying these positions. For the position of pilots, navigators and bombardiers, there is no significant difference in incidence, as has been confirmed from the findings of the U. S. Eighth Air Force.

Some Factors Related to Psychological Breakdown

In discussing maladaptive reactions of aviationists, Mebane (1961, p. 449) says: 'Psychiatric problems in aviation today combine ancient patterns of human emotional reactivity with many environmental stresses which are new and exciting'. Neurotic predisposition of the aircrew and the flying and non-flying stresses are the major factors in the causation of psychological disorders. Flying stress has reference to the amount of hazard encountered in flying, the hazard being measured against the usual and normal expectations of danger in flying. Non-flying stress refers to all the other types of stress, domestic, financial and personal to which the flier is subjected. Other writers, for example, Mebane, have referred to the flying and non-flying stresses as 'Primary Load Factors' (associated with conditions of flight) and 'Secondary Load Factors' (related to environmental support to the flier).

The nature of flying stress has been briefly discussed in an earlier section. It may be pointed out that actual combat danger has been the most important single cause of emotional breakdown in many theatres of the last war. Bond (p. 179) calculated the actual number of emotional casualties among heavy bomber crewmen and number of aircraft lost or missing in action. He found that during the period May 1943 to May 1945 there was one emotional casualty for approximately every two aircraft lost in action. Figure 1 below reproduces graphs for aircraft (heavy bombers) missing in action (A/C MIA), number of anxiety reactions in the aircrew and total number of sorties flown.

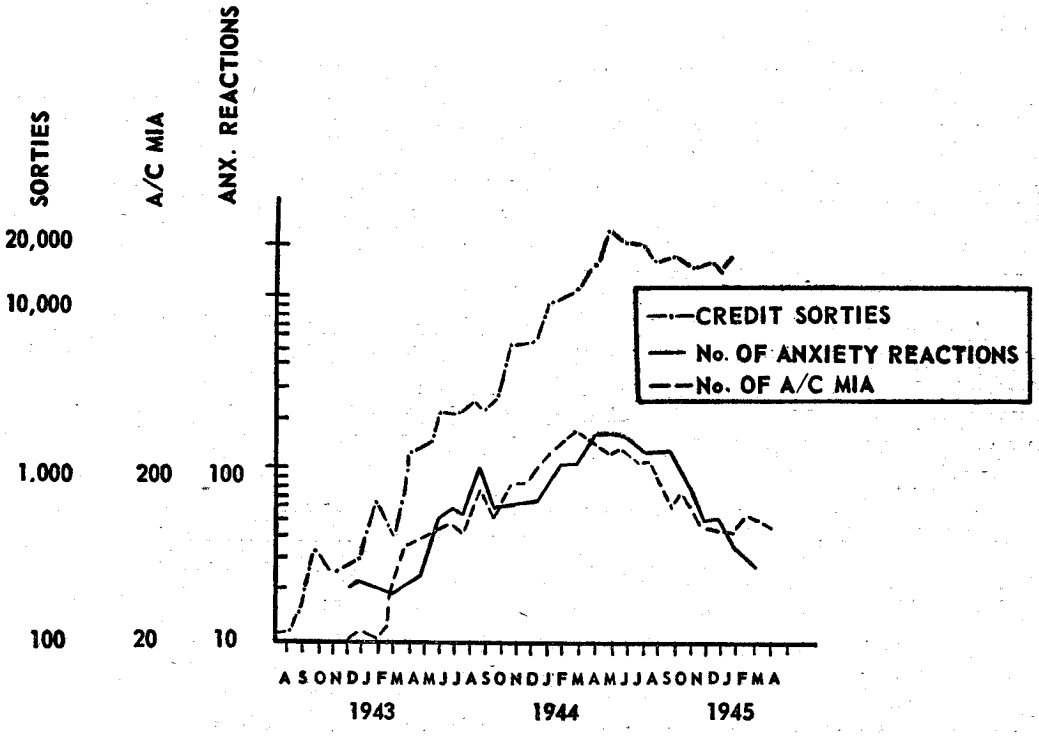

FIG 1—Relationship between Anxiety Reactions. Sorties and Aircraft Missing in Action (A/C MIA) (Bod 1952)

It is seen that emotional casualties are more closely related to flying hazard than to total amount of flying activity. The correlation between the first two sets of figures was 0·8. Bond concludes: "..... the degree of closeness (between aircraft lost in combat and emotional casualties) is such that it is doubtful that any other factor can approach it (A/C MIA) in importance".

Symonds (Air Ministry—1947) similarly found a close relation between psychological breakdown and risk involved as measured by relative flying hours per casualty (Table 6).

TABLE 6

RELATIONSHIP BETWEEN PSYCHOLOGICAL BREAKDOWN AND RISK

Duty	Percent Incidence of Neurosis	Safety Factor (flying hours per casualty)
Bomber	12·0	160
Fighter—day	6·0	188
Fighter—night	3·4	231
Coastal Command	3·3	360
Training	1·1	1,960

An important constituent of primary load factors or flying stress is catastrophies or traumatic experiences of various types in the air. Crippled aircraft, engine failures, fire in the air, horrifying sights, personal losses or injuries, loss of intimate friends or important leaders have all some traumatic effect. Sometimes a single traumatic experience is enough to lead to the onset of a full-fledged neurosis; at other times, a series of such experiences add up together and lead to the breakdown.

Amongst other factors of flying stress, mention has been made of heat, cold, loss of sleep, high altitude flying, forced inactivity or passivity in the face of danger (a major factor in the higher breakdown rates in air gunner and wireless operators as compared to pilots), uncomfortable personal equipment etc. Enemy defences like heavy flak and fighter opposition add to the danger of operation and thereby contribute to psychological breakdowns.

Amongst factors having a protective value against breakdowns are a positive motivation towards flying on the part of the aviationist, high group morale in the squadron, confidence in the leader and in other air and ground crew and finally, adequate and sound training. With regard to motivation, Bond has this to say:

"In a study of 100 successful men, particularly of the fighter pilots, the satisfaction they obtained from combat stood as a bulwark against trauma and went hand in hand with superior performance. Of the twenty-two successful fighter pilots, there were ten with a love of flying that dated back to early childhood, and amongst these ten were those with the greatest number of victories ..... The men who showed themselves outstanding seemed to have as their common bond both a strong love of flying and a still stronger delight in the expression of their aggressions in the air".

Bond's further conclusion that 'chance and the ability to gratify these deep libidinal and aggressive drives were of far more significance in determining the manner in which men met combat and flying than were other factors such as identification with their own groups, hatred for the enemy, leadership, their own character structures, or their own neurotic dispositions' might certainly be true of a few pilots with outstanding achievement (men who 'enjoyed the war too much' and were mostly emotionally unbalanced) rather than for most men who did a competent but perhaps not an outstanding job. For these latter, group life might have had a more positive meaning and value.

The role of neurotic predisposition in those who broke down under combat conditions as compared to those who did not assume some importance from the selection point of view. Tables 7 and 8 give some comparative data from the R.A.F. and the U. S. Eighth Air Force (from Williams in Air Ministry—1947 and Bond).

TABLE 7

DEGREE OF PREDISPOSITION IN NORMAL AND NEUROTIC FLYING CREW IN THE R.A.F.

Predisposition	Normal flying personnel (N: 100)	Flying personnel with psychological disorders (N: 1,197)
Nil	85%	32%
Mild	12	52
Severe	3	16
Total	15%	68%

TABLE 8

DEGREE OF PREDISPOSITION IN NORMAL AND NEUROTIC FLYING CREW IN THE EIGHTH AIR FORCE

Predisposition	Successful flying personnel not breaking in combat (N=100)	Flying personnel 'breaking' in combat (N=1,120)
Mild or None	85%	68·6%
Moderate	15	21·4
Severe		10·0

In Table 7 all cases of predisposition were marked as 'Severe' on the criterion that in case this had been recognised at the time of selection (on the basis of personal or family history

or both), this predisposition by itself would have prevented their selection to aircrew. All cases of predisposition not 'Severe' were marked as 'Mild'. In Table 8, 'Severe' predisposition refers to such individuals who would have a 'covert neurotic breakdown even in civil life'.

(*i*) It will be seen from the above two tables that flying personnel who later broke down had a general predisposition rate two to four times that in the normal aircrew.

(*ii*) An inverse or reciprocal relationship exists between flying stress and predisposition. In individuals where one of these factors was severe, the casual significance of the other in the onset of neurosis was slight.

(*iii*) There is considerable difference of opinion regarding a policy for the selection or rejection of neurotically predisposed candidates. Nearly all experts agree that 'mild' or 'moderately' predisposed candidates should not be excluded from joining the aircrew. Regarding the 'severely' predisposed, whereas Symonds of the R.A.F., would favour his rejection at the outset, Bond of the U.S.A.F. is inclined to give him a chance. Bond's primary consideration against initial rejection of such people is that according to him, the motivation and performance of some of the most neurotic men (especially amongst fighter pilots) was so superior that each of these was worth at least ten others. Bond emphasises, with some truth, that selection is a continuous process and that more attention should be given to early detection of signs of breakdown along a man's career rather than rejecting or accepting him once for all.

It may be concluded that although the view that selection is a continuous process is certainly logical, to have an adequate machinery for psychological and psychiatric examination of each flying crew member at different stages of his career is a difficult proposition. A decision, therefore, has to be taken regarding rejection of candidates at the initial selection stage. Since the answer will also depend upon other factors like the manpower needs of the air force, it is surmisable that no absolute decision on this question can be taken once for all but the problem has to be reviewed from time to time. In general, however, the desirability of rejecting some candidates at the selection stage on grounds of very severe neurotic predisposition can not be denied, and indeed may save lot of bother later on.

Prognosis

Some facts about prognosis have already been noted in the first section of this paper. For example, in the entire Indian Air Force, on an average, 18% of psychological disorders lead to invalidation out of the Air Force. This figure for flying crew is, however, much less, about 12%. In the R.A.F., one sample showed an invalidation rate of 1·1%. In a nine month follow up of 204 R A.F. psychiatric cases returned to duty after gaining full category, the following breakdown was noted:—

Returned to operational flying	46%
Returned to non-operational flying	36%
Did no flying after return	18%

This means that 82% of the returned cases went back to some form of flying duty. However "training wastage in returned cases is twice normal expectation.....the breakdown rate is three times normal expectation".

For the entire R.A.F. in World War II, 22·5% of men who had broken down were returned to full flying duties (Mebane—1961; p. 465). In the U.S.A. during World War II two-thirds of the flying officers returned to full flying duties. But in a group of flying enlisted men, only 23% did so. The poorer prognosis in the latter might be due to lower selection standards and less personal attention from the flight surgeon. During the Korean campaign, 74·5% of psychiatric cases in the U.S.A.F. returned to full flying duties. Lighter operational load and better medical support during this campaign seem to be responsible for this improvement.

Return to flying duties seems to be dependent on several factors. The more important among these are the neurotic predisposition in the person, the flying stress he has endured and the opportunity of early treatment. Other things being equal, it can be said that higher the predisposition, greater is the chance of the man's losing flying status; for example, in a R.A.F. group, only 8% of 335 individuals with 'severe' predisposition were returned to full flying. On the other hand, chance of returning to flying is greater amongst those who break down as a result of severe or considerable stress than among those who break down with none or mild flying stress.

A related problem is the quality and quantity of work of returned psychiatric casualties. This, however, is a complicated question on which no reliable data are available and will, therefore, not be discussed here.

Concluding Remarks

The published data regarding psychological breakdowns in military fliers are quite sketchy and mostly out of date. However, from the foregoing paragraphs, certain broad general conclusions are derivable. These are given below—

(1) The overall incidence of psychological breakdowns in flying crew of any air force during times of war is unlikely to exceed the rate of 50 per thousand persons. In peace time, the rates will be less than 5 per thousand; it may be much less depending upon the nature of operations, effectiveness of selection procedure and treatment facilities available.

(2) This incidence rate varies substantially amongst air crews in different commands and in the same aircraft performing different duties. The incidence is likely to be the highest in night bomber crews and lowest in night fighter crews. Also those members who are forced to remain passive for substantial part of their flying time are more susceptible to breakdowns.

(3) The primary cause of these disorders is nearly always psychological in nature, rather than other factors like injury, illness etc.

(4) Fear is the most important of these psychological factors. Frequency of psychological breakdowns in any aircrew is very closely related to the operational hazard.

(5) Two-third or more of these breakdowns take the form of neurosis.

(6) Anxiety reactions are the commonest form of neurosis (50% or more) amongst flying personnel; hysteria and neurotic depression are the next two important reactions.

(7) Amongst psychotic cases, schizophrenia is the overwhelmingly prevalent reaction.

(8) Since invalidation rates depend upon the needs of the service, treatment facilities and amount of neurotic predisposition in the subject, it varies much in different air forces. In the I.A.F., nearly one-tenth of the psychological cases are invalidated out of the service.

(9) For reasons given in (8) above, return to full flying also varies. The best record upto now seems to be that of the U.S.A.F. which succeeded in returning three-fourths of its psychiatric casualties in the Korean campaign to full flying.

Controlling this problem of psychological disorders demand attention to four points: (*i*) setting up of minimum acceptable standards of neurotic predisposition and motivation for flying at the initial selection stage; (*ii*) adequate facilities for psychiatric checks in the course of a flier's career; (*iii*) early and adequate treatment facilities; and (*iv*) strengthening of squadron morale and leadership since these serve as protection against psychological breakdowns. Finally, it may also be mentioned that highly anxious subjects, before they become actually ill, have their flying effectiveness cut down in diverse ways; for example through reduced altitude tolerance and increased susceptibility to such phenomena like motion sickness etc. Also, since psychological breakdowns are primarily related to safety in flight, collaboration of air force directorates having to do with flight safety will be useful to the psychiatrist and psychologist in their attempts at control of such breakdowns.

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