Flying Fatigue in Twentieth-Century Britain: An Uncertain Zone

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Abstract

In the nineteenth and twentieth centuries fatigue was a common workplace complaint. As chairman of the Civil Aviation Authority Lord John Boyd-Carpenter put it in 1974, though, it occupied an 'uncertain zone'.[1] Vague and contestable throughout the century, and linked inextricably to working practices, fatigue proved fertile ground for debate. With a specific focus on civil aviation and aircrew, this thesis traces the shifting explanations of and responses to flying fatigue from the start of the First World War to the formal institution of Crew Resource Management (CRM) training in the mid-1990s. Beginning with a discussion of fatigue as it was constituted and examined in industrial and military settings in the first half of the twentieth century, this thesis then turns to post-war civil aviation. The models of fatigue developed by Flying Personnel Research Committee (FPRC) researchers during wartime framed post-war understandings of fatigue. Conceptualised as performance decrement in some instances, in other contexts fatigue was considered in terms of sleep and wakefulness. Regardless of definition, the apparent dangers of aircrew fatigue were agreed upon. Linked to air accidents throughout the century, the fatigue of aircrew was thought to have implications for flight safety. This thesis examines how these various discourses of fatigue informed – and were informed by – military policies, regulatory frameworks, and airline-union negotiations. Drawing on a rich base of oral history interviews with flight deck and cabin crew, it looks, also, at the ways in which fatigue was experienced and given new meaning in quotidian contexts. Examining flying fatigue in relation to broader post-war concerns about productivity, public safety, and the health and welfare of workers, this thesis offers new perspectives on the complex interplay between science, industry, and society in middle and late twentieth-century Britain.

[1] The National Archives BT 248/511: Internal CAA Memo to Mr Vivian from Lord Boyd-Carpenter, 21 May 1974, p. 1.

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List of Abbreviations

AAIB	Air Accidents Investigation Branch
APU	Applied Psychology Unit
ASSET	Association of Supervisory Staffs and Executive Technicians
AT&T	Aircraft Transport and Travel
BA	British Airways
BALPA	British Airline Pilots Association
BARSA	British Airways Retired Staff Association
BEA	British European Airways
BMA	British Medical Association
BOAC	British Overseas Airways Corporation
CAA	Civil Aviation Authority
CAP	Civil Aviation Publication
CHIRP	Confidential Human Factors Incident Reporting Programme
CRM	Crew Resource Management
ERS	Ergonomics Research Society
FPRC	Flying Personnel Research Committee
FTLB	Flight Time Limitations Board
HMWC	Health of Munitions Workers Committee
HSWA	Health and Safety at Work Act
IA	Imperial Airways
IATA	International Air Transport Association
ICAO	International Civil Aviation Organisation

IFRB	Industrial Fatigue Research Board
IHRB	Industrial Health Research Board
IWS	Industrial Welfare Society
MRC	Medical Research Council
NASA	National Aeronautics and Space Administration
NHS	National Health Service
NIIP	National Institute of Industrial Psychology
OTU	Operational Training Unit
RAF	Royal Air Force
RFC	Royal Flying Corps
TGWU	Transport and General Workers' Union
TUC	Trades Union Congress
WAAF	Women's Auxiliary Air Force

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Science, Work, and Management in the Twentieth Century

> During the months from August 1917 to November 1918, inclusive, close on 2,000 flying officers passed through [a] special hospital unit; of these over forty per cent were deemed to be suffering from the fatigue inseparable from active service.[1]

Flying fatigue was first identified as a discrete issue affecting aircrew during the First World War, but was subject to increasing investigation in the post-war period. From 1939, the Flying Personnel Research Committee (FPRC) – a research team composed of clinicians, psychologists, physiologists, and members of the Royal Air Force (RAF) – investigated the causes, signs, and means of preventing fatigue in aircrew. The rationale for this research was simple: to optimise operational efficiency. The research undertaken by the FPRC between 1939 and 1945 produced a complex picture of flying fatigue. While some FPRC researchers argued, in line with interwar theories of flying stress, that flying fatigue was primarily a psychological phenomenon, others looked to working hours and physiology, citing hypoxia, mechanical factors, and the intensification of wartime processes as the primary causes of pilot fatigue.[2] Though there were discrepancies, an essential model of fatigue

[1] James L. Birley, 'Goulstoninan Lectures on the Principles of Medical Science as Applied to Military Aviation: Lecture I', *The Lancet*, 195, 5048 (1920) 1147-1151, p. 1148.
[2] Wellcome Library (hereafter referred to as WL) PP/HEW/L.7/6: Institute of Aviation Medicine Report 615, 'British Aviation Medicine During the Second World War, Part 5: Fatigue, Flying Stress and Accidents', 1982.

emerged in this period. This was, in a sense, a dual discourse. Fatigue, the FPRC held, should be considered both in terms of performance decrement and wakefulness. Consensus existed, though, on the implications of fatigue. Thought to increase the likelihood of human error and 'accident proneness', flying fatigue was a 'serious concern'.[3]

Turning to the half century after 1939, this thesis traces shifting explanations of and responses to flying fatigue from the start of the Second World War to the formal institution of Crew Resource Management (CRM) training in the aftermath of the 1989 Kegworth air crash. Situating flying fatigue within a broader context of employment in post-war Britain, it argues that concerns about tiredness within civil and military aviation were but one manifestation of wider middle and late-twentieth century anxieties about work, productivity, and public safety. Political and cultural attitudes to these issues were broadly contested and refashioned in the aftermath of the Second World War.[4] In this period health and safety regulation underwent a profound shift; British economic performance and the apparent 'productivity gap' between Britain and other western European countries was widely debated; and Britain transitioned from an economy built around manufacturing and manual labour to one based on service and office work.[5] In examining the fatigue of airline

[3] The National Archives (hereafter referred to as TNA) AIR 57/10: Squadron Leader D. D. Reid, 'FPRC Report 508: The Influence of Psychological Disorder on Efficiency in Operational Flying', September 1942, p. 11; TNA AIR 57/10: Squadron Leader Denis Williams, 'FPRC Report 505: The Effect of Mental Fatigue Upon the Electroencephalogram', December 1942, p. 1.

[4] Christopher Sirrs, 'Accidents and Apathy: The Construction of the "Robens Philosophy" of Occupational Safety and Health Regulation in Britain, 1961-1974', *Social History of Medicine*, 29, 1 (2016) 66-88.

[5] Ibid; Jim Tomlinson, 'Inventing "Decline": The Falling Behind of the British Economy in the Postwar Years', *Economic History Review*, 49, 4 (1996) 731-757; Stephen Broadberry and Nicholas Crafts, 'UK Productivity Performance from 1950 to 1979: A Restatement of the Broadberry-Crafts View', *Economic History Review*, 56, 4 (2003) 718-735; Alan Booth, 'The

pilots in relation to these broader post-war changes, this thesis offers a new perspective on the complex interplay between science, industry, and society in middle and late-twentieth century Britain.

The purpose of this introduction is to lay the historical and intellectual groundwork for the four thematic chapters that follow. It begins with a discussion of how fatigue was conceived of by medical and industrial writers in the nineteenth and twentieth centuries. The second section introduces some of the key historiography. This thesis intersects with, and seeks to bring together, a diverse and extensive range of historical literature. Thematically this work draws not only on histories of fatigue, but also of other human factors, transport, employment, occupational health and safety, gender, and the news media. Given this range, the literature review focuses on the histories that are most pertinent to the central themes of this thesis: histories of aviation and occupational health and safety. Finally, following discussion of sources and methodology, the arguments made across the four central chapters of this thesis are outlined.

Framing Fatigue: Science, Industry, and Society Before 1939

In the seventeenth century intellectual and cultural attitudes to work began a profound renegotiation. In philosophical and economic treatises, work was increasingly moralised and rationalised. John Locke (1632-1704), and other classical political economists, drew on Calvinist doctrine to justify both the centrality of work and the source of its value. Productive work, according to

Manufacturing Failure Hypothesis and the Performance of British Industry during the Long Boom', *Economic History Review*, 56, 1 (2003) 1-33.

this new intellectual discourse, was at once noble, rational, and moral. Idleness, on the other hand, was increasingly critiqued.[6] Though idleness had been subject to criticism long before this – the Christian concept of acedia featured prominently in theological treatises on sin from the fourth century – the new discourse of productive labour popularised in the seventeenth century saw idleness as not just sinful, but irrational.[7]

In the last quarter of the nineteenth century, this largely intellectual debate about the value of work, gave way to a new scientific project. It was in this context that the concept of fatigue emerged. In the 1860s and 1870s new literature stressing the hygienic aspect of work gained traction. Though this literature often retained moralistic overtones, it increasingly framed work in materialist – specifically physiological – terms. Indeed, much of this new literature considered the physiological and moral qualities of work as complementary. As Apollonaire Bourchardat (1809-1886), professor of hygiene at the faculty of medicine at the University of Paris, told an audience of skilled workers in 1862, regular labour was both a 'condition of health' and of 'morality'.[8] Anson Rabinbach has demonstrated that this new conceptualisation of human labour relied on the scientific theory of thermodynamics popularised by German physician and physicist Hermann von Helmholtz (1821-1894) in the middle decades of the nineteenth century. Helmholtz held that energy was a singular and universal force that could not be created or destroyed; it was ever shifting but constant. In his popular

[6] Anson Rabinbach, *The Human Motor: Energy, Fatigue, and the Origins of Modernity*, (Los Angeles: University of California Press, 1992).
[7] Anna Katharina Schaffner, *Exhaustion: A History*, (New York: Columbia University Press, 2016).
[8] Rabinbach, *The Human Motor*, p. 36.

lectures and writings Helmholtz portrayed the movements of the planets, the productive force of machines, and human labour, as examples of the universal law of energy conservation. They were all, he argued, part of a vast and protean reservoir of energy.[9]

From the mid-nineteenth century the labour of men and machines was increasingly measured using techniques developed within the material sciences. The methodologies pioneered by engineers for the measurement of metal fatigue proved particularly popular. The concept of metal fatigue was first documented in an 1854 lecture delivered to the London Institution of Civil Engineers by railway engineer Frederick Braithwaite (1798-1865). Braithwaite cited the 'fatigue of metals' as a primary cause of railway accidents:

> There are reasons for believing, that many of the appalling, and apparently unaccountable accidents on railways, and elsewhere, are to be ascribed to that progressive action which may be termed, the 'fatigue of metals'. This fatigue may arise from a variety of causes, such as repeated strain, blows, concussions, jerks, torsion, or tension.[10]

It had been known for some time that continuous strain caused iron to crystallise and eventually break, but, as Wolfgang Schivelbusch has shown, the expansion of railways in the nineteenth century hastened the development of this concept.[11] In the mid-nineteenth century a number of large-scale railway disasters were attributed to material fatigue. One of the most

[9] Ibid.
[10] Frederick Braithwaite, 'On the Fatigue and Consequent Fracture of Metals', *Minutes of the Proceedings of the Institution of Civil Engineers*, 13 (1854) 463-467, p. 463.
[11] Wolfgang Schivelbusch, *The Railway Journey: The Industrialisation of Time and Space in the Nineteenth Century*, (Berkley: University of California Press, 1986).

catastrophic rail accidents of the century occurred near Versailles, France, in 1842 as the result of a broken axle. Fifty-five passengers died and over 100 others were injured. Following the incident engineers throughout continental Europe increasingly turned their attention to metal fatigue. In 1861 Scottish engineer William Fairbairn (1789-1874) conducted research into the failure of metallic structures at the request of the British parliament. His research, partially funded by the Board of Trade, used large-scale testing set-ups to measure the effects of repeated loading on wrought and cast-iron girders. Fairbairn was one of many European engineers to develop testing machinery of this kind. In the same decade German engineer August Wöhler (1819-1914) investigated the failure mechanism of railway axles by applying controlled load cycles using a specially developed machine. The methodology developed by these engineers – in particular, their use of standardised testing technology – pointed to new ways of investigating human labour.[12]

Physiologists readily adopted both the semantic and conceptual apparatus underlying the theory of thermodynamics and the modes of testing popularised by material scientists in the mid-nineteenth century. Interpreted through the dynamic language of physics, the human body was increasingly conceived of as a field of forces to be investigated and measured by scientific technologies designed for that purpose, such as Italian physiologist Angelo Mosso's (1846-1910) ergograph, which measured muscular exertion. The human body, like the mechanical motor, became framed as a site of energy conservation and conversion.[13] By the 1890s, the laboratory study of

[12] Ibid.
[13] Rabinbach, *The Human Motor*.

energetic work was well established. As Rabinbach has described, these early laboratory studies of human labour and fatigue were largely limited to tracing specific, isolated muscles subjected to artificially induced stress.

At the turn of the twentieth century, however, scientific studies of fatigue were increasingly carried out within the workplace. The rapid expansion of factories, mills, mines, and other industrial workplaces in the late nineteenth century ignited fierce debate about the place of the human body in industrial production.[14] Worker fatigue – which was bound up with broader concerns about working practices, social justice, and productivity – was central here. Keen to contribute to this debate, physiologists increasingly focused their attention on fatigue. This research, which centred on the physiology of labour, looked to uncover both the mechanism of human fatigue and the most efficient means of energy expenditure.

From the 1890s advocates of the new science of work became increasingly interested in the practical implications of this research. In Britain, and elsewhere, a number of socially minded industrialists conducted experiments within the workplace. Moving beyond the laboratory, these studies sought to determine the relation between productivity, working hours, and workers' health and wellbeing.[15] In 1893 William Mather (1838-1920), an industrialist and politician, implemented an experimental forty-eight hour working week at the Salford Ironworks. Mather found that absenteeism was significantly reduced (from 2.5% in a fifty-three hour working week, down to

[14] Robin Wolfe Scheffler, 'The Fate of a Progressive Science: The Harvard Fatigue Laboratory, Athletes, the Science of Work and the Politics of Reform', *Endeavour*, 35, 2-3 (2011) 48-54.
[15] A. J. McIvor, 'Employers, the Government, and Industrial Fatigue in Britain, 1890-1918', *British Journal of Industrial Medicine*, 44, 11 (1987) 724-732.

0.5%) and that output increased. Mather and his foremen regarded the reduction of fatigue as the primary cause of increased productivity and denied that workers had made a 'special effort' during the trial year. As Mather noted in a letter published in the *Times* on 31 May 1894:

> The very careful observations of our foremen are conclusive on this point. They, one and all, declare that the abolition of the two hours' work before breakfast, with its accompanying strain of a very early rise and for many men a long walk without food, has produced a different mental and physical condition throughout the day. The foremen themselves in their own persons feel the difference, and without any conscious spurt on their part, they say everything is lighter and easier in the performance of their duties. They have, therefore, no difficulty in explaining why the output of the men is as great under our present system as under the longer hours. *The whole gain comes from the altered conditions of employment*.[16]

The reduction in working hours, Mather argued, had a cumulative, rippling effect. It impacted on the entire lifestyle of the worker. Given the apparent success of Mather's experiment, a number of other workplaces, including the Royal Dockyards, took up the forty-eight hour working week. In the main though, British employers dismissed Mather's experiment. Few private employers took the suggestion up, and a fifty-three or fifty-four hour working week remained the norm in most British firms. Similar experiments were, however, carried out elsewhere, most notably at Zeiss Optics in Germany in 1901 and at the Engis Chemical Works in Belgium in 1905.[17] Arthur McIvor

[16] William Mather, 'Mr Mather's Report on the Forty-Eight Hour Week', *Times*, May 31 1894, p. 13.
[17] McIvor, 'Employers, the Government, and Industrial Fatigue in Britain, 1890-1918'.

has suggested that, though the relationship between worker fatigue and industrial efficiency was discussed in these studies, it was not the central concern of industrialists. Reform was, rather, motivated by humanitarian concerns: it was an 'expression of Victorian social conscience'.[18]

On the other side of the Atlantic reform was driven by economic interests. Scientific management, a school of thought based on the work of American engineer Frederick Winslow Taylor (1856-1915) was employed in American workplaces from the 1880s. It was primarily concerned with the physical efficiency of individual workers and sought, as Daniel Nelson has shown, to 'reintegrate the fragmented industrial plant of the late nineteenth century' through a rationalisation and standardisation of work.[19] These aims underlay a number of studies carried out by Taylor and his associates at American steel companies in the late nineteenth and early twentieth centuries. In these experiments Taylor and his contemporaries employed time and motion studies, and measured the effect of incentive – or piece rate – wages on productivity.[20] These studies sought to maximise productivity, irrespective of the physiological cost to the worker and, as such, were subject to criticism by social reformers on both sides of the Atlantic.

Partly as a result of these workplace studies, by the turn of the twentieth century industrial fatigue was widely discussed throughout Western Europe and America. In 1903 the International Congress on Hygiene and Demography passed a resolution urging governments to seriously investigate

[18] Ibid. p. 725.
[19] Daniel Nelson, 'Scientific Management, Systematic Management, and Labor, 1880-1915', *The Business History Review*, 48, 4 (1974) 479-500, p. 480.
[20] Daniel Nelson, 'Taylorism and the Workers at Bethlehem Steel, 1898-1901', *The Pennsylvania Magazine of History and Biography*, 101, 4 (1977) 487-505.

the issue of industrial fatigue. In 1904 the Interdepartmental Committee on Physical Deterioration made a similar recommendation to the British government. The Committee, which was established to investigate the health of the nation following the Boer War (1899-1901), found that physical deterioration was caused by several interrelated factors including 'over-fatigue' due to the nature and conditions of industrial work, poor diet, and disease.[21] The Committee concluded that 'there should be a strictly scientific enquiry into the physiological causation and effects of over-fatigue'.[22] As a result, in 1913 the British Home Office appointed A. F. Stanley Kent (1863-1958), professor of physiology at the University of Bristol, to undertake a series of experiments on industrial fatigue. Though Kent did not publish the results of these investigations until 1915, his appointment indicates that the concept of industrial fatigue had penetrated high government prior to the First World War.

The war, with the demands it brought for strenuous and long-maintained effort by workers on the home front, however, solidified this interest. The experiences of workers in wartime industries exposed, according to McIvor, a 'critical lack of knowledge' in Britain of the laws governing human health and efficiency.[23] Alan Derickson has shown that, when Britain first entered the war in 1914, it launched a frenetic drive to produce military equipment and supplies.[24] Hours of labour lengthened – particularly for munitions workers who, between 1914 and 1915, worked an average of

[21] McIvor, 'Employers, the Government, and Industrial Fatigue in Britain, 1890-1918', p. 729.
[22] Ibid. p. 729.
[23] Ibid. p. 730.
[24] Alan Derickson, 'Physiological Science and Scientific Management in the Progressive Era: Frederic S. Lee and the Committee on Industrial Fatigue', *The Business History Review*, 68, 4 (1994) 483-514.

seventy-five to eighty-five hours a week – but output stalled.[25] Accidents, spoiled work, absenteeism and other manifestations of fatigue abounded in wartime industries.[26] In response to these concerns, the Health of Munitions Workers Committee (HMWC) was established in September 1915 to consider and advise on questions of industrial fatigue, hours of labour and other matters affecting the personal health and efficiency of workers in munitions factories and workshops.[27] It was in this context that fatigue became expressly tied to concerns about output, a conceptual orientation that would structure fatigue research well into the second half of the twentieth century.

The HMWC constituted, for the first time in British industrial history, a conglomeration of medical and health researchers, industrialists, representatives of labour, academics, and administrators. Prior to this, medical practitioners were virtually absent from British industry, but war provided a precondition for medical and scientific entry into the workplace, that some had been calling for since the 1890s.[28] The Committee functioned for a little over two years, until the end of 1917, during which time it produced twenty-one memoranda, two reports, and a handbook on the health of munitions workers. Committee members interviewed employers, workers, and factory inspectorates, and visited factories to ascertain at first hand the conditions under which munitions work was being carried out. This evidence was combined with a series of laboratory experiments by physiologists, psychologists, statisticians, and medical researchers on a range of issues relating to industrial health, efficiency, and fatigue. Marking a break with

[25] McIvor, 'Employers, the Government, and Industrial Fatigue in Britain, 1890-1918'.
[26] Derickson, 'Physiological Science and Scientific Management in the Progressive Era'.
[27] McIvor, 'Employers, the Government, and Industrial Fatigue in Britain, 1890-1918'.
[28] Ibid.

nineteenth-century laboratory studies of fatigue, the Committee regarded diminished capacity for work – in other words, reduced output – as the most 'direct and practical indicator of fatigue'.[29]

The Committee's main conclusions can be summarised as follows: that physical health was key for successful industrial production and that, contrary to received wisdom on industrial illness, the dominant cause of ill-health was long working hours. The relationship between hours of work and output was, however, found to be complex. The Committee found that, although workers' rate of output fell after eight hours on the job, their total output after ten or more hours of work still exceeded that accomplished on the shorter shift.[30] With labour in short supply and production demands high, intensive working practices were deemed necessary, if regrettable. As such, the Committee recommended only modest limitations on working hours. A January 1916 memorandum, for example, urged that adult men work no more than sixty-seven hours per week and that women of all ages and boys under sixteen years old work for no more than sixty hours.[31]

The memoranda produced by the HMWC were widely circulated to employers and other industrial psychologists. According to the final report of the Committee, published in 1918, more than 200,000 of its memoranda were in circulation and its recommendations had received a 'wide measure of acceptance' among British industrialists.[32] Partly as a result of this apparent success, the activities of the HMWC received widespread attention in Britain

[29] Ibid. p. 731.
[30] Vicky Long, *The Rise and Fall of the Healthy Factory: The Politics of Industrial Health in Britain, 1914-60*, (Basingstoke: Palgrave Macmillan, 2011).
[31] Derickson, 'Physiological Science and Scientific Management in the Progressive Era'.
[32] Steven Kreis, 'Early Experiments in British Scientific Management: The Health of Munitions Workers' Committee, 1915-1920', *Journal of Management History*, 1, 2 (1995) 65-78, p. 70.

and elsewhere. In April 1917, following American entry into the First World War, the country's Bureau of Labour Statistics reprinted most of the HMWC's memoranda and the Russell Sage Foundation and other private agents also disseminated the Committee's recommendations. Under the guidance of Philip Sargant Florence (1890-1982), previously of the HMWC, and Frederic S. Lee (1859-1939), similar studies were conducted in America with the Ford Motor Group in July 1917 and the Scovill Manufacturing Company in October 1917.[33] In these studies Florence and Lee found, as in Britain, that short rest breaks and limitations on hours improved the productivity of workers.

In reaching these conclusions, Florence and Lee found themselves at odds with the dominant model of workplace management in America: Taylorism. Taylor only tacitly acknowledged the costs of overwork. In *The Principles of Scientific Management* first published in 1911, he argued that:

> It should be distinctly understood that in no case is the workman called upon to work at a pace which would be injurious to his health. The task is always regulated that the man who is well suited to his job will thrive while working at this rate during a long term of years and grow happier and more prosperous, instead of being overworked.[34]

For Florence and Lee, though, scientific management was too preoccupied with the problem of underwork – particularly deliberate slow-working, or 'soldiering' as Taylor termed it – which, they argued, implicitly trivialised worker fatigue.[35]

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[33] Derickson, 'Physiological Science and Scientific Management in the Progressive Era'.
[34] Frederick Winslow Taylor, *The Principles of Scientific Management*, (London: Harper and Brothers Publishers, 1919), p. 39.
[35] Ibid. p. 13.

Florence's former employer, the HMWC, was equally critical of Taylorism. Steven Kreis has demonstrated that, though HMWC investigators were certainly familiar with Taylor's work they believed, like their American counterparts, that he placed too great an emphasis on the relationship between work and remuneration. The 1917 interim report of the Committee argued that the Taylorite system of scientific management was too preoccupied with fixing piece rates in an attempt to limit 'soldiering':

> In America much has recently been done, in association with what is known as 'scientific management', to eliminate useless movements and lessen physical effort, but, somehow unfortunately, the subject has got wrapped up with 'time studies' used for fixing piece rates, and there is, in consequence, a tendency for it to be looked on with disfavour by wage-earners, while the real value of its teaching is being lost sight of.[36]

For the HMWC the duration and distribution of work and rest was more important in the reduction of fatigue and the maximisation of productivity than an incentive system based on fixed piece rates. Tensions between the American model of scientific management and the British approach to industrial health and efficiency continued into the post-war period.

In the interwar years the work of the HMWC continued, albeit in a different form. After the First World War three new organisations were established to develop and expand the work of HMWC: the Industrial Fatigue Research Board (IFRB, which in 1928 was renamed the Industrial Health Research Board), the National Institute of Industrial Psychology (NIIP), and

[36] Kreis, 'Early Experiments in British Scientific Management', p. 69.

the Industrial Welfare Society (IWS). All these organisations had similar aims, but approached issues of worker health and welfare from different angles. The IFRB adopted a similar approach to the HMWC. The Board positioned itself within the science of work tradition and, in its early years, took a mainly neurophysiological approach to industrial fatigue. The NIIP, on the other hand, situated its approach within the burgeoning field of industrial psychology. Composed mostly of psychologists, the NIIP focused on aptitude, workplace relations, and productivity. Unlike the IFRB and the NIIP, the IWS extended its remit beyond the workplace. Based on the long-held assumption that living conditions affected the health and welfare of workers as much as the conditions of the workplace, the Society claimed an interest in staff both at work and at home. Though they differed in scope and approach, each public agency was at the forefront of attempts to discover and elucidate what was routinely called 'the human factor in industry'.[37] All engaged with the problem of fatigue. This both legitimised scientific interest in industrial fatigue as a concept and added new dimensions to how it was conceived of in scientific and lay circles.

Set up in 1918 to 'develop and extend' the investigations of the HMWC, the IFRB investigated how factors such as lighting, temperature, ventilation, nutrition, personality, and hours of work and rest affected workers' productivity and health.[38] Staffed initially by physicians and physiologists, the Board was chaired by Sir Charles Sherrington (1857-1952), an English neurophysiologist

[37] Ibid. p. 67.
[38] Anon, 'Industrial Fatigue Research Board', *The Lancet*, 195, 5052 (1920) 1372, p. 1372.

who was renowned for his pioneering work on neural functioning.[39] The academic background of its investigators informed the Board's initial approach and methodology. As in previous investigations, the work of the Board involved a mix of fieldwork in different workplaces and laboratory research. According to IFRB investigator B. Muscio, this research consisted of three major strands. The first involved laboratory research on somatic expressions of fatigue, while the second and third focused on indirect measures of fatigue in the workplace and the laboratory respectively. Reflecting the broader early twentieth-century pursuit of somatic correlates for psychic states, the first strand discussed by Muscio used non-voluntary physiological phenomena, such as changes in blood pressure and pulse, as indicators of fatigue. Ultimately though, IFRB researchers abandoned this mode of investigation. As Muscio described in a 1921 article published in the *British Journal of Psychology*, in these studies investigators found it impossible to examine fatigue in isolation. The personality and emotional states of subjects frequently influenced results, which made it, Muscio argued, difficult to establish the role of fatigue in physiological arousal.[40]

From the early 1920s the Board mainly used indirect phenomena as measures of fatigue. Following HMWC precedent, in the workplace investigators measured the quantity and quality of output, while in the laboratory performance tests were used as retrospective indicators of fatigue. As Muscio described, in these instances fatigue was inferred when output or performance diminished:

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[39] Peter Warr, 'Some Historical Developments in I-O Psychology Outside the United States' in Laura L. Koppes (ed.), *Historical Perspectives in Industrial and Organisational Psychology*, (Hove: Psychology Press, 2014), pp. 81-110.
[40] B. Muscio, 'Is a Fatigue Test Possible?', *British Journal of Psychology*, 12, 1 (1921) 31-46.

> Since fatigue, in the present sense, cannot be directly observed, we require (before fatigue test experimentation begins) something observable (an *expression* of fatigue) from which its presence can be inferred. The *accepted* 'expression' (diminished capacity) is itself not directly observable; and consequently, we require an observable expression of this 'expression' of fatigue, from which the presence of diminished capacity (and hence of fatigue) may be inferred.[41]

As with investigations for non-voluntary physiological expressions of fatigue, performance tests were undertaken in the laboratory. Like their nineteenth-century predecessors, IFRB investigators tested muscular strength, precision, and rapidity using instruments such as the ergograph and the kata-thermometer, a device developed by British physiologist Leonard Hill (1866-1952) to measure the combined effects of temperature and air velocity.[42] Investigators also designed mental and physical tasks that had readily quantifiable results, for example tapping and dart throwing.

Alongside these laboratory studies, the Board also carried out a number of workshop tests designed to measure the quality and quantity of industrial output. Some investigators charted hourly output curves under different conditions by using recording equipment to quantify the impact of certain working practices. Others employed a methodology favoured by American researchers but widely despised by workers and trade unions: time and motion studies. IFRB investigators were, however, wary of causing conflict with workers and trade union officials so advocated close union co-operation during any work measurement exercise. Also, unlike their American

[41] Ibid. pp. 35-36.
[42] A. J. McIvor, 'Manual Work, Technology, and Industrial Health, 1918-39', *Medical History*, 31, 2 (1987) 160-189.

counterparts, IFRB researchers did not use stopwatches to set standard times. As McIvor has suggested though, workers continued to be suspicious of this aspect of the Board's work. They regarded time and motion studies as 'an interference and a humiliation, and a first step to speeding up production'.[43]

Between 1918 and 1939 the IFRB produced eighty-four special research monographs and numerous articles on the optimum conditions and methods of work for operatives. Much of the work produced by the IFRB indicated that productivity was closely linked to working hours and rest. Productivity, the IFRB argued, dropped significantly towards the end of a long shift as workers became increasingly bored and tired. The most productive worker, the Board suggested, was 'the steady worker'.[44] Drawing a parallel with professional running, the Board argued:

> It confirms what might have been anticipated from athletics, where the best long distance runners cover lap after lap at the same rapid rate, in contrast to the performance of less efficient runners who vary their pace.[45]

Workers should not, the IFRB thus reasoned, be compelled to complete work quickly, but should be allowed to maintain their own pace of work and take regular rest breaks.

The Board emphasised the diversity of human physical and mental capabilities, as well as the variable nature of energy levels. Like its

[43] Ibid. p. 170.
[44] Anon, 'Fatigue and Output in the Boot Industry', *The Lancet*, 196, 5075 (1920) 1154-1155, p. 1155.
[45] Ibid. p. 1155.

predecessor, the IFRB was critical of the American model of scientific management. The Board was particularly disparaging of the idea that a universally applicable mode of efficient work existed. The IFRB's 1937 annual report argued that the complexities of the 'human machine' should be respected:

> The work of the human machine cannot be ticked out in seconds as a clock. It has a rhythm, and the rhythm varies – work has its ups and downs – in tune to the pulse of physical and mental energy, which itself rises and ebbs in accordance with the physiological laws governing the functions of all living organisms.[46]

The natural rhythm of each worker was, the Board argued, different and as such workers should not be required to conform to a standardised scheme of work.

This focus on the individuality of workers marked a point of convergence between the IFRB and the NIIP. Founded in 1921 by Charles Myers (1873-1946) and Henry Welch, the NIIP professed similar aims to the IFRB. It was founded, according to Alan Collins, to promote and encourage the 'practical application of the sciences of psychology and physiology to commerce and industry'.[47] It set out to be scientific, impartial, and commercially neutral but, unlike the IFRB, investigated issues relevant to particular firms rather than the broader workforce. The NIIP's investigations broadly reflected the interests and expertise of its founders: Myers was a

[46] McIvor, 'Manual Work, Technology, and Industrial Health, 1918-39', p. 171.
[47] Alan Collins, 'England', in David B. Baker (ed.), *The Oxford Handbook of the History of Psychology: Global Perspectives*, (Oxford: Oxford University Press, 2012), pp. 182-210, p. 197.

pre-eminent industrial psychologist in interwar Britain who left his post at the Psychology Laboratory at the University of Cambridge for the NIIP; and Welch was a businessman with interests in vocational guidance and selection. There were two main strands of research. The first focused on social and ethical issues and involved studies of worker-management relations, group organisation and workplace participation. The other – 'technical' – strand sought to enhance worker efficiency, reduce fatigue, and improve training and personnel selection.[48] The dual aims of the NIIP were summarised in 1929 by Welch:

> We all look forward to a time when working people of all types in this country will be engaged in the work for which their temperaments and abilities most fit them, and when they will be able to return to their homes after a day's work is done, not too fatigued or disgruntled to interest themselves according to their inclinations and capacities, in literature, art, music and the higher things of life.[49]

Expressing a similar sentiment to Mather half a century earlier, Welch proposed that work should not exhaust. The whole lifestyle of the worker was important for health and productivity.

Though the IFRB and NIIP were officially separate, partly as a result of reduced central funding in the 1920s, the organisations formally collaborated throughout the early and mid-twentieth century. Investigators moved freely between organisations. Myers was, for example, involved in the work of both

[48] Graham Richards, *Putting Psychology in its Place: A Critical Historical Overview*, (New York: Routledge, 2002), p. 178.
[49] Sarah Bakewell, 'Illustrations from the Wellcome Institute Library: The Life and Times of the Myers Collection', *Medical History*, 37 (1993) 197-200, pp. 200-201.

the NIIP and the IFRB throughout the 1920s and 1930s. The close relationship fostered between the organisations in the interwar period influenced the approach of investigators. Following collaboration with NIIP psychologists, IFRB researchers shifted their focus from hours of work and environmental conditions to methods of work, job design, and vocational psychology – the main interests of the NIIP. From the 1920s, the IFRB increasingly focused on vocational guidance and performance testing, and worked to develop techniques to ensure workers were placed in the occupations for which they were best suited. A 1922 report produced by Muscio and colleagues, for example, investigated the relationship between job suitability and fatigue. It concluded that when workers were unsuited to a task they were more liable to fatigue, so vocational selection was an important means of offsetting overstrain.[50]

Though closely connected throughout the 1920s and 1930s, the investigators employed by the NIIP reached different conclusions to their colleagues in the IFRB. While the NIIP located the problem of lost productivity partly in long working hours and poor safety procedures researchers gave most weight to other factors, namely individual psychology and workplace design. One of the major conclusions to come out of the NIIP's research was that fatigue could be reduced by 'relatively simple changes' in work-bench design and layout, or placement of materials.[51] Given this emphasis, the NIIP was subject to the same criticisms levelled at the American model of scientific management, the HMWC, and the IFRB: that the organisation intended to

[50] McIvor, 'Manual Work, Technology, and Industrial Health, 1918-1939'.
[51] Richards, *Putting Psychology in its Place,* p. 178.

maximise efficiency at any cost. For this reason, the psychologists employed by the NIIP were often met with hostility from workers, who saw the organisation as siding with management. Collins has shown, however, that the NIIP explicitly tried to disassociate itself from American inspired systems.[52] Indeed, many of the psychologists employed by the NIIP were explicitly critical of Taylorism. For them, the NIIP intended to promote a more humanistic model of workplace efficiency that privileged the mental and bodily health of workers above industrial output. In his 1920 monograph *Mind and Work*, Meyers laid out these differences. Like his colleagues in the IFRB, Meyers claimed that the model of scientific management promoted by the NIIP was more humane than that practised by the Taylorite school as it recognised and allowed for the fact that different modes of work suited different people:

> Shorthand reduces fatigue and increases efficiency, but there are various methods of shorthand just as there are various first-class styles of golfing or violin-playing. It is psychologically most improbable that any one good method or style can ever be the best for all persons, and it remains for psychological research to determine the relation between individual physical and mental differences and the different methods needed to satisfy these differences. While the employee should be trained from the start in what has been proved to be one of the best methods, he should be at full liberty to substitute another, if he prefers it and can show that it is effective. To aim at pressing all workers into the same mold is not only to destroy individuality and to encourage needless monotony, but also to run counter to known psychological principles. It is the outcome of so called 'scientific' management,

[52] Alan Collins, 'England'; Kreis, 'Early Experiments in British Scientific Management'.

> mechanically formulated by the engineer, in which the mental factors of personality, sentiment, and sympathy are sacrificed to purely physical considerations.[53]

The aim, according to Myers, was not to exploit workers as in Taylorism, but to design work environments and practices in which all parties' interests were met.[54]

The IWS professed similar aims. Founded in 1918 by R. R. Hyde, one of Benjamin Seebohm Rowntree's (1871-1954) staff at the Welfare Department of the Ministry of Munitions, the IWS worked closely with the IFRB and the NIIP. The Society played an important role in disseminating the research findings of both organisations, which it published in the journal *Industrial Welfare and Personnel Management*. The recommendations of the IFRB were incorporated into the 1937 Factory Act, which introduced basic standards of health, safety, and welfare at work. McIvor has demonstrated, however, that in general diffusion of the IFRB and NIIP's findings was negligible. Indeed, following the Dunkirk evacuation in 1940 workers involved in war industries commonly worked up to seventy-five hours a week. The Medical Research Council (MRC), which oversaw the work of the IFRB, lamented the limited impact of the Board's research findings in a report published shortly after the cessation of hostilities:

> It is regrettable that but little was known about this work either by many industry leaders or by the mass of workmen in the early stages of the war. Had this information been more widely appreciated it might have

[53] Charles Myers, *Mind and Work*: *The Psychological Factors in Industry and Commerce*, (London: G. P. Putnam's Sons, 1921), pp. 20-21.
[54] Richards, *Putting Psychology in its Place.*

> been possible to avoid the introduction of those excessively strenuous working conditions in the period immediately following the evacuation from Dunkirk which proved incompatible with a large sustained output from factories and with a good standard of health among the workpeople.[55]

McIvor has suggested that the impact of the IFRB was likely limited due to a communication gap between the Board and industrialists. Employing a criticism often levelled at academic researchers today, McIvor has argued that the practical men of business clashed with the inward-facing 'ivory-tower' academics of the Board.[56] Industrialists mistrusted the work of the IFRB, particularly that carried out in laboratories, which was held to be largely theoretical and of little practical value.[57] As such, most British industry registered a negative response to the ideology purported by the IFRB and associated organisations and remained committed to traditional modes of labour management based on the scientifically-outmoded belief that a 'linear relationship' existed between hours of work and output.[58]

Vanessa Heggie, Robin Wolfe Scheffler, and others have shown that similar research was carried out in America during this period, most notably in the Harvard Fatigue Laboratory, a joint venture of the Harvard Business and Medical Schools.[59] Though the Laboratory professed an interest in 'everyday

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[55] McIvor, 'Manual Work, Technology, and Industrial Health, 1918-39', p. 182.
[56] Ibid. p. 186.
[57] Ibid.
[58] Ibid. p. 187.
[59] Vanessa Heggie, 'Special Section: Harvard Fatigue Laboratory', *Journal of the History of Biology*, 48 (2015) 361-364; Robin Wolfe Scheffler, 'The Power of Exercise and the Exercise of Power: The Harvard Fatigue Laboratory, Distance Running, and the Disappearance of Work', *Journal of the History of Biology*, 48, 3 (2015) 391-423; a number of experiments into the effect of fatigue on productivity were also performed at the Hawthorne works of the Western Electric Company in Chicago from November 1924 onwards, see: E. A. M. Gale, 'The Hawthorne Studies – A Fable for Our Times?', *Quarterly Journal of Medicine*, 97 (2004) 439-449.

life', including industrial fatigue, much of the work carried out by its staff focused on extreme physiology.[60] Through treadmill experiments – in which the cardiac function and energy consumption of elite athletes, such as seven-time Boston Marathon champion Clarence De-Mar (1888-1958), was measured during strenuous cardiovascular exercise – the Laboratory posited a different definition of fatigue than that employed in Britain. While HMWC and IFRB studies suggested that energy was finite and depleted by work, the treadmill studies of distance running conducted in the Harvard Fatigue Laboratory suggested that it was possible for humans to maintain a 'steady state' – or internal chemical equilibrium – for long periods of exertion with no ill effects.[61]

Though the treadmill studies provided the first tangible scientific evidence of this hypothesis, the idea itself was not entirely new. Indeed, in a December 1906 presidential address to the American Philosophical Association at Columbia University, philosopher and psychologist William James (1842-1910), proposed that it was possible for humans to reach an 'efficiency-equilibrium'.[62] Unlike James' suggestion earlier in the century, the conclusion reached by the Harvard team was 'explosive politically'.[63] The implications for the workplace were stark. The steady state hypothesis held that industrial fatigue could be alleviated by chemically rebalancing workers, removing the need for rest. This hypothesis was put into practice in the summer of 1934, when the Laboratory was invited to visit a steel mill in

[60] Mark Jackson, *Age of Stress: Science and the Search for Stability*, (Oxford: Oxford University Press, 2013), p. 61.
[61] Scheffler, 'The Fate of a Progressive Science', p. 48.
[62] William James, 'The Energies of Men', *Science*, 25, 635 (1907) 321-332, p. 324.
[63] Scheffler, 'The Fate of a Progressive Science', p. 50.

Youngstown, Ohio, to investigate the incidence of heat exhaustion among steelworkers. The visiting team endorsed one simple, minimally disruptive, change: the addition of trace salts to workers' drinking water. Rather than wholesale institutional changes to the conditions or practices of the workplace, like those generally proposed by IFRB investigators – such as reducing working hours or increasing ventilation around blast furnaces – the Laboratory's staff advocated an approach based on rebalancing individual workers.[64]

While the steady state hypothesis did not inform workplace policy in Britain, as it did in America, the essential model of fatigue as a state of imbalance proposed by the Harvard Fatigue Laboratory was reflected in the work of a small number of industrial hygienists. Howard E. Collier (1890-1953), a reader in Industrial Hygiene at the University of Birmingham, described fatigue as a state of 'unbalance' in a 1936 paper read at a meeting of the British Association for the Advancement of Science.[65] For Collier, fatigue occurred as a result of an 'absence of harmony' between 'the organism and its environment or between the various subordinate parts within the organism itself' or, more basically, between 'intake and output':

> In fatigue, output exceeds intake; katabolism is greater than anabolism. Rest, change, and sleep as well as food and air are important factors, therefore, both in the maintenance of health and the production of fatigue. It is importance to recognise that 'unbalance' may be

[64] Ibid.
[65] Howard E. Collier, 'The Recognition of Fatigue, With Special Reference to the Clinical Diagnosis of Morbid Fatigue in Industry', *British Medical Journal*, 2, 3964 (1936) 1322-1325, p. 1323.

> qualitative and quantitative, and that it may be due only to the time factor – that is, to a lag in recuperation after work has been done.[66]

Fatigue, according to Collier, was caused by conditions both within and beyond the factory. Taking a more radical position than his contemporaries employed by the IFRB and the NIIP, Collier argued that the abolition of 'morbid fatigue from industry' called for a wholesale reorganisation of British employment practices.[67] He suggested, in particular, that night work and overtime – both, he argued, 'prolific' causes of fatigue – should be discouraged and that the time and cost associated with travel to and from work should be subject to review.[68]

In the years following the First World War human factors research was not limited to the home front. Psychological and physiological studies of military recruits abounded. Much of this research shared similar aims to that conducted in an industrial setting. Military investigations were interested, primarily, in maximising the efficiency of fighting men and women through a combination of appropriate selection procedures and working practices.[69] The boundary between military and civil research during this period was permeable and diffuse. A number of investigators employed by the IFRB and NIIP were seconded to military committees following the 1914-1918 war. In 1919, for example, two leading IFRB investigators, Major Greenwood (1880-1949) and Hilda Mary Woods (1892-1971), were seconded to a committee

[66] Ibid. p. 1323.
[67] Ibid. p. 1325.
[68] Ibid. p. 1325.
[69] Alice White, *From the Science of Selection to the Pyschologising of Civvy Street: The Tavistock Group, 1939-1948*, PhD Thesis, (University of Kent, 2015).

appointed to advise on 'certain medical aspects of the Flying Service'.[70] With backgrounds in epidemiology and statistics, Greenwood and Woods investigated the relationship between personality, accidents, and fatigue. They were interested, in particular, in developing tests which would be suitable to determine the aptitude of entrants for the Flying Service, and to determine whether persons who had broken down, or who had been sent back from the front for wounds, were fit to return to duty.[71]

Even in instances where researchers did not explicitly collaborate with industrialists, many took inspiration from industrial fatigue committees. Air Commodore A. V. J. Richardson, the RAF's Director of Medical Services, encouraged engagement with industrial fatigue research in a 1935 address to the United Services Section of the Royal Society of Medicine: 'Are there not lessons to be learnt in industry and applied in the Services?'[72] After all, he concluded, were not the primary concerns of business and military service synonymous? A decade later Lord Moran (1882-1977) made a similar argument in a volume outlining the psychological effects of warfare. While making the case for the 'healing effect of leave' for soldiers, Lord Moran noted that the 'worker at his bench needs rest too, for he is suffering the same malady'.[73]

The relationship between industrial fatigue research and the military services was solidified in January 1939, following the creation of the FPRC.

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[70] John C. Burnham, *Accident Prone: A History of Technology, Psychology, and Misfits of the Machine Age*, (Chicago: University of Chicago Press, 2009), p. 54.
[71] Ibid.
[72] A. V. J. Richardson, 'Efficiency of Personnel in the Services', *Journal of the Royal Army Medical Corps*, 66, 1 (1936) 14-20, pp. 14-15.
[73] Lord Moran, *The Anatomy of Courage: The Classic WWI Account of the Psychological Effects of War*, second edition, (London: Robinson, 2007), p. 76; Ibid. p. 81.

Established by the Secretary of State for Air to investigate medical aspects relating to safety and efficiency in flying, the Committee initially prioritised the technical and physiological issues associated with flight. Research was carried out into oxygen equipment, protection against gravitational forces, noise, vision, and fatigue. From October 1939, though, psychological studies began. Research was split, broadly, between the RAF Physiological Laboratory (later renamed the RAF Institute of Aviation Medicine) and the Psychological Laboratory, both contained within the University of Cambridge.

The Physiological Laboratory was run by Bryan Matthews (1906-1986), who was later involved in the first ascent of Everest, with support from the secretary of FPRC, Air Commodore Harold Whittingham (1887-1983). Researchers employed by the Laboratory investigated the physical effects of altitude and oxygen deprivation (hypoxia) on the human body, and looked to find ways of supplying pilots with adequate ventilation in flight.[74] The Psychological Laboratory, run by Frederic Bartlett (1886-1969), paid greater attention to selection and psychiatric assessment. Patrick Waterson has demonstrated, however, that the FPRC set up clear lines of communication between the two institutions and, as in industrial fatigue research in the interwar period, psychologists and physiologists often worked closely to solve complex problems, including the fatigue of RAF pilots.[75] Much of this research was influenced by the work produced by industrial fatigue committees in the

[74] For the history of physiology at high altitudes, see: Vanessa Heggie, 'Experimental Physiology, Everest and Oxygen: From the Ghastly Kitchens to the Gasping Lung', *British Journal for the History of Science*, 46, 1 (2013) 123-147; Vanessa Heggie, 'Higher and Colder: The Success and Failure of Boundaries in High Altitude and Antarctic Research Stations', *Social Studies of Science*, 46, 6 (2016) 809-832.
[75] Patrick Waterson, 'World War II and other historical influences on the formation of the Ergonomics Research Society', *Ergonomics*, 54, 12 (2011) 1111-1129.

interwar period, in part because many of the investigators seconded to the FPRC had previously served on (either or both) the IFRB or NIIP. Bartlett, for example, had contributed to the work of both organisations in the 1930s.

The work of the organisations discussed here did not end in the aftermath of the 1939-1945 war but, for the most part, their remit and reach shrank in size and importance. Both the IFRB and the NIIP continued in operation into the second half of the twentieth century – they closed in 1959 and 1977 respectively – but in the post-war period research on fatigue and human factors was increasingly taken over by other bodies including the Applied Psychology Unit (APU) at the University of Cambridge, of which Bartlett was the founding director, and the Ergonomics Research Society (ERS).[76] The work of the FPRC, however, continued in earnest in the post-war period. Indeed, The National Archives now holds over 1,200 of the reports produced by the Committee between 1939 and 1959. In an article published in *Agenda* in 1944, Bartlett made the case for the continuation of the FPRC clear:

> The guiding principle [of the FPRC] is to determine how the most widely distributed capacities in the way of mental and bodily behaviour can be efficiently exercised. In a number of war directions this has been done, but exceedingly little has been effected with regard to common industrial functions or any of the arts of peace.[77]

[76] Warr, 'Some Historical Developments in I-O Psychology Outside the United States'.
[77] Waterson, 'World War II and other historical influences on the formation of the Ergonomics Research Society', p. 1122.

Following the cessation of hostilities the FPRC continued to research and report on issues relating to fatigue and work capacity in both military and civil settings and, from the 1960s, was involved in arbitration relating to fatigue and workload for two commercial airlines.

Fatigue was researched in a number of different contexts in the first half of the twentieth century, but it remained a vague and indefinite concept. Though widely acknowledged as a common and sometimes disabling complaint, fatigue was an elusive entity. The word had many different meanings. It was a slippery concept, thought to border on and overlap with various kindred phenomena, such as boredom and depression. It was thought to manifest both physically – as lassitude, lethargy, and weakness – and mentally.[78] Fatigue, thus, presented a dilemma for scientists. As British physiologist Reginald Passmore (1910-1999) noted in a 1954 review of an ERS volume on the subject:

> For although a phenomenon familiar to everyone it has defied exact definition, and only in fragmentary aspects has it been made accessible to scientific methods of study … the reader is left with no doubt about the difficulties and uncertainties of the subject.[79]

In the twentieth century fatigue was, then, a malleable concept. The scientific work described here lent the term legitimacy – and, importantly, cultural

[78] Schnaffner, *Exhaustion.*
[79] R. Passmore, 'Review: The Ergonomics Research Society: Symposium on Fatigue', *Quarterly Journal of Experimental Physiology and Cognate Medical Sciences*, 39, 2 (1954) 121, p. 121; see W. F. Floyd and A. T. Welford (eds.), *Ergonomics Research Society: Symposium on Fatigue*, (London: H. K. Lewis & Company, 1953).

currency – but neither the mechanisms, nor the manifestations, of fatigue were widely agreed on.

This thesis is as much about how fatigue was constituted, negotiated, and interpreted in various contexts, as it is about the concept of fatigue itself. Fatigue occupied, as chairman of the Civil Aviation Authority (CAA) Lord John Boyd-Carpenter (1908-1998) put it in 1974, an 'uncertain zone'.[80] Consistently bound up with debates about pay, working practices, and worker wellbeing, fatigue meant different things in different contexts.

Histories of Occupational Fatigue in Post-War Britain

Implicit in the histories of occupational fatigue discussed so far is a statement about chronology. Many of the histories cited here examine industrial fatigue in Britain and America between the mid-nineteenth century and the start of the Second World War. In these histories, industrial fatigue is framed as a primarily interwar phenomenon, with intellectual roots in the middle and late nineteenth century. According to these histories industrial fatigue, like the science of work more generally, declined in intellectual significance in the aftermath of the Second World War. The decline of industrial fatigue research has been explained by the formalisation of industrial psychology in the post-war period. Vicky Long, Alison Haggett, Sarah Hayes, and Rhodri Hayward have argued that while the inter-war period had been dominated by concerns about physical and mental fatigue, the decades following the Second World War saw a shift in industrial medicine towards a focus on the psychological

[80] TNA BT 248/511: Internal CAA Memo to Mr Vivian from Lord Boyd-Carpenter, 21 May 1974, p. 1.

pressures of new working practices. Research on workplace fatigue became subsumed within these broader projects and was, these histories argue, rarely investigated, regulated, or discussed in the second half of the twentieth century.

In the post-war period concerns about worker wellbeing and productivity became, according to these histories, bound-up with a different psychophysiological complaint: stress. During the twentieth century the concept of stress became an increasingly popular framework for understanding the ability of workers to cope with the demands of the modern workplace.[82] Historians disagree about precisely when stress emerged as a conceptual tool for explaining distress. While some argue that stress is inseparable from modern life, citing the Second World War as a 'watershed, or turning point', others trace a longer history.[83] David Cantor and Edmund Ramsden, for example, have suggested that stress built on, but also gradually displaced, nineteenth and early-twentieth century work on nervous exhaustion and fatigue.[84] Joseph Melling concurs. While, he argues, terms such as 'fatigue' and 'strain' were commonly used in scientific and quotidian contexts until the 1930s, by the post-war period 'stress' had become the most common way of framing psychophysiological distress in the workplace.[85] In the post-war period structural responses to worker distress were also reframed in the

[82] Mark Jackson, 'Stress in Post-War Britain: An Introduction' in Mark Jackson (ed.), *Stress in Post-War Britain, 1945-85*, (London: Pickering and Chatto, 2015), pp. 1-16.
[83] Ibid. p. 6.
[84] David Cantor and Edmund Ramsden, 'Introduction' in David Cantor and Edmund Ramsden (eds.), *Stress, Shock, and Adaptation in the Twentieth Century*, (Rochester: University of Rochester Press, 2014), pp. 1-20.
[85] Joseph Melling, 'Making Sense of Workplace Fear: The Role of Physicians, Psychiatrists, and Labor in Reframing Occupational Strain in Industrial Britain, ca. 1850-1970' in David Cantor and Edmund Ramsden (eds.), *Stress, Shock, and Adaptation in the Twentieth Century*, (University of Rochester Press: Rochester, 2014), pp. 189-221.

language of stress. These came, as Ayesha Nathoo has shown, to centre on the management of mental distress rather than the avoidance of physical fatigue.[86] This saw potent manifestation in the 1980s, with the expansion of the 'stress-management' marketplace.[87]

This thesis demonstrates, however, that concerns about occupational fatigue continued into the post-war period. Scientific and political interest in the physical fatigue of working men and women was by no means as widespread as it had been prior to and during the Second World War, but it remained a concern in industries that relied on precision and efficiency.[88] In this context, fatigue was reconceptualised. While previously, fatigue was explicitly framed in relation to productivity, in the post-war period, models of fatigue came to centre on the effect of fatigue on performance, and the implications this had for safety. As Robert S. Schwab (1903-1972), a neurologist based at the Harvard Medical School, put it in 1953:

> People with chronic fatigue interfere seriously with the high efficiency demanded of the Army, Navy and Air Force. They are a source of reduced output, lowered quality and inefficiency … in industry. Tired look-outs lead ships into disaster; and weary engineers miss red signals.[89]

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[86] Ayesha Nathoo, 'Initiating Therapeutic Relaxation in Britain: A Twentieth-Century Strategy for Health and Wellbeing', *Palgrave Communications*, 2 (2016), 1-10, available at: http://www.palgrave-journals.com/articles/palcomms201643 [last accessed 20 July 2016].
[87] Ibid. p. 9.
[88] Alan Derickson, *Dangerously Sleepy: Overworked Americans and the Cult of Manly Wakefulness*, (Philadelphia: University of Pennsylvania Press, 2014), p. 27.
[89] Robert S. Schwab, 'Motivation in Measurements of Fatigue' in W. F. Floyd and A. T. Welford (eds.), *Ergonomics Research Society: Symposium on Fatigue*, (London: H. K. Lewis & Company, 1953), pp. 143-148, p. 143.

The fatigue of aircrew was deemed particularly high risk. As Lord Moran put it in 1945, 'the pilot's life is forfeit if he mishandles his instruments, a single error may be fatal'. The isolated nature of flight, particularly under wartime conditions, was central to this conceptualisation of risk. With few (or, in the case of fighter pilots, no) colleagues to directly assist in the prosecution of war in the air, the solitary pilot was 'without the support of numbers'. [90] In this context human error could have grave consequences.

It was recognised that workers from all industries could become fatigued under certain circumstances: long working hours, shift work, and night work were all preconditions for fatigue. Though these conditions were not industry-specific, by the 1940s they were commonplace in only a handful of different occupations. Gary Cross has argued that by 1940 the average working day in Western Europe had fallen from between ten and twelve hours, to eight hours.[91] Some industries, however, required employees to work much longer hours as standard, while others necessitated shift and night work.[92] Fatigue was endemic in industries that demanded these working practices. Derickson has shown that, in America, sleep deprivation was common in a number of different industries, including the steel industry and the transport sector.[93] In the British case fatigue was also endemic within the National Health Service (NHS). In these contexts, the fatigue of workers was reconceptualised. Although still thought to play an important role in workplace efficiency, it was also linked with safety.

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[90] Lord Moran, *The Anatomy of Courage*, p. 104.
[91] Gary Cross, *The Quest for Time: The Reduction of Work in Britain and France, 1840-1940*, (Berkeley: University of California Press, 1989).
[92] David Walker, *Occupational Health and Safety in the British Chemical Industry, 1914-1974*, PhD Thesis, (University of Strathclyde, 2007).
[93] Derickson, *Dangerously Sleepy.*

Fatigue was first noted as a problem that might effect healthcare practitioners in a 1919 article by German physician Geheimerat Hecker.[94] Hecker described the relationship between working conditions, cultural change, and the mental and physical health of nurses. Arguing that nurses often became pathologically fatigued as a result of their work, Hecker's paper was one of the first academic publications to suggest that fatigue might be an occupational health issue specific to nursing. By the 1930s his contention that nursing could negatively impact health was well established in Britain.[95] Both the duties involved in nursing and the schedule associated with it were thought to be potentially fatigue-inducing. Deborah Palmer has shown that nursing, particularly in the early twentieth century, was a physically demanding job.[96] Nurses were expected to move and bathe patients with little assistance. [97] The working hours associated with nursing were also thought to be particularly fatiguing. Hospital nurses were required to work shifts, which sometimes involved night work.[98]

In the late-twentieth century these commonly described complaints were reconceptualised as a discrete syndrome affecting the health of healthcare workers: burnout, a term coined by German-born American psychologist Herbert Freudenberger (1926-1999) in 1974.[99] The defining features of burnout were, according to Freudenberger, mental and physical exhaustion, persistent illness, insomnia, and shortness of breath. Burnout also

[94] G. Hecker, 'The Overstrain of Nurses', *British Journal of Nursing*, (1 March 1919) 134-5.
[95] Deborah Palmer, *Who Cared for the Carers? A History of the Occupational Health of Nurses, 1880-1948*, (Manchester: Manchester University Press, 2014).
[96] Ibid.
[97] Bernice Fash and Frances Powell, 'Body Mechanics in Nursing Arts', *The American Journal of Nursing*, 41, 2 (1941) 190-195.
[98] Genevieve E. Fiedor and Majorie L. Keys, 'Coping with Nights', *The American Journal of Nursing*, 87, 9 (1987) 1166-1169.
[99] Herbert J. Freudenberger, 'Staff Burn-Out', *Journal of Social Issues*, 30, 1 (1974) 159-165.

affected the behaviour of healthcare workers: they became prone to paranoia, overconfidence, and were easily irritated. Freudenberger suggested that individuals were most likely to experience burnout if they worked in free clinics. Clinics, he argued, were inherently energy-draining institutions, as they required both long and intensive working hours, and a deep emotional commitment on the part of the worker.[100] For Freudenberger then, burnout was at once a physical and psychological problem. It was caused as much by intensive working practices as it was by mental distress.

In the middle and late decades of the twentieth century, fatigue was also endemic in the transport industry. Railway workers, seafarers, professional drivers, and workers employed in civil airlines were subject to many of the same conditions as healthcare workers: long hours of work, shift work, and night work – sometimes referred to as 'sleeper' operations – were common in all these contexts.[101] As Nicholas McDonald noted in a 1984 monograph on the fatigue of professional drivers, *Fatigue, Safety and the Truck Driver*, a number of other issues specific to transport work exacerbated fatigue. These included long monotonous stretches of work, congestion and delays, cab temperature, noise, and vibration.[102] Fatigue, McDonald argued, was problematic for transport workers – particularly for the drivers of heavy goods vehicles – because it impacted performance. Fatigued drivers, he argued, found it difficult to judge the speed they were travelling, they were inattentive, and their vehicle handling was poor. They had a tendency to 'lane

[100] Ibid.
[101] Derickson, *Dangerously Sleep*y; Nicholas McDonald, *Fatigue, Safety and the Truck Driver*, (London: Taylor and Francis, 1984), p. 175.
[102] McDonald, *Fatigue, Safety and the Truck Driver.*

wander'.[103] In extreme circumstances, fatigued drivers fell 'asleep at the wheel'.[104]

In both the healthcare and transport industries, worker fatigue had implications beyond occupational health and efficiency. Given the centrality of the public to these services, worker fatigue also affected the wider populace. Travellers and patients were, in this sense, distinct from other publics in the nineteenth and twentieth centuries. They served, according to Ralph Harrington, as the raw material for what was in effect an 'industrial system', the end-product of which was mass transportation on the one hand, and healthcare on the other.[105] In his study of nineteenth-century railways, Schivelbusch described the implications of the 'instant consumer' thus:

> The railroad's industrial product is transportation, change of locality, what makes this production fundamentally different from all other industrial production is exactly that *simultaneity* of production and consumption. The consumption of industrially manufactured objects takes place at a temporal and spatial distance from their production. Their industrial character finds only indirect expression … But in the production of transportation, where the traveller is the instant consumer, the industrial character is experienced in the act of travel itself.[106]

[103] Ibid. p. 178.
[104] Ibid. p. 177.
[105] Ralph Harrington, 'The Railway Journey and the Neuroses of Modernity' in Richard Wrigley and George Revill (eds.), *Pathologies of Travel*, (Amsterdam: Rodopi, 2000), pp. 229-261, p. 240.
[106] Schivelbusch, *The Railway Journey,* p. 120.

The ‘simultaneity’, as Schivelbusch termed it, of production and consumption meant that travellers were subject to the same safety concerns as railway workers, bus drivers, and commercial pilots.[107]

Trade unions representing transport workers made this case throughout the middle and late twentieth century. Fatigued drivers, it was argued, were more likely to cause accidents, thus endangering the lives of other road users, and constituting ‘a danger to the public’.[108] Associations representing healthcare professionals in the twentieth century, including the British Medical Association (BMA) and the Junior Hospital Doctors’ Association, framed the fatigue of physicians similarly. As Dr Francis Pigott, chairman of the Junior Hospital Doctors’ Association, stated in an interview quoted at length in a front-page article in the *Times* in 1969: doctor fatigue was a ‘death risk’ for patients.[109] Doctors, Pigott argued, became fatigued as a result of excessive working hours and were liable to serious misjudgements and medical error as a result.[110]

In civil aviation, the fatigue of airline pilots was first conceptualised as an issue with the potential to effect passenger safety in the 1950s after a number of accidents were attributed to crew fatigue. Fatigue was thought to cause accidents in two different ways: firstly, through poor performance and error; and secondly, as a result of flight crew falling asleep at the controls. Researchers interested in military aviation first articulated the performance

[107] Ibid. p. 120.
[108] TNA MT/92/107: Notes of a Meeting held at St. Christopher House to discuss drivers’ hours, 8 November 1961, p. 1.
[109] Tim Jones, ‘Doctors’ Hours “A Death Risk”’, *Times*, Mar 7 1969, p. 1.
[110] Ibid.

decrement model of fatigue.[111] In line with earlier work on the effect of fatigue on industrial performance and output, researchers argued that fatigue negatively impacted the performance of pilots in a number of ways. Pilots might complete the same amount of work as when well-rested but at a slower pace; pilots might complete work to a lower standard, making an increasing number of errors; or pilots might experience a combination of the two, completing work at a slower pace and with more errors than when well rested. Poor performance, researchers argued, made accidents more likely.

The other cause of accidents – pilots unintentionally sleeping on the flight deck – gained increasing attention from regulators in the 1970s, as a spate of newspaper reports emerged on the subject. Sleepiness was thought to be a particular problem for long haul pilots, who had to contend with two major issues: disruption to their circadian rhythms as a result of crossing time zones; and extended flight times. It was, however, a problem that could effect all pilots. One former pilot and trainer explained the irresistible urge to sleep when fatigued as such:

> The thing about sleep is that if your body really wants you to sleep, you'll sleep. If you're flying an aeroplane on the approach, if you're driving at seventy miles an hour, you'll sleep. And I can give you an even better example of that, I'd been flying very hard, a lot of hours, training navigators and … I got back into the circuit and I was downwind ready to turn on into the airfield and land and I went to sleep. I just nodded off and I woke up and I saw a church spire and so I

[111] See for example: TNA DSIR 23/22938: D. C. Fraser, 'The Study of Fatigue', August 1954; WL PP/HEW/F.4/1: Letter to Sir Harold Whittingham from Air Commodore Consultant in Neuro-Psychiatry, 18 December 1942, including 'Exhaustion in Relation to Fighting Efficiency in Flying Personnel'; R. H. Stanbridge, 'Fatigue in Aircrew: Observations in the Berlin Airlift', *The Lancet*, 258, 6671 (1951) 1-3.

> continued to turn, and there was the runway and I landed the airplane. But that's what can happen to you.[112]

Whether related to skill decrement or sleepiness, the dangers of pilot fatigue were clear and alarming.

Flying fatigue was, then, conceptualised differently to industrial fatigue. While safety and accident-proneness had been a concern in munitions factories during the Second World War, the fatigue of industrial workers was, for the most part, framed in terms of output and productivity. Flying fatigue, however, was explicitly framed in terms of public safety throughout the twentieth century. As this thesis will set out, though, in the middle and late-twentieth century scientists, medical officers, and regulatory agencies continued to rely on models of fatigue that had roots in the nineteenth century. Performance continued to be used as a measure of fatigue. While nineteenth and early-twentieth century research bodies tended to use diminished output as an indicator of fatigue, flying fatigue came to be framed in relation to performance decrement. Early-twentieth century understandings of fatigue as both physical and psychological also saw continuing expression in the middle and late twentieth century. The FPRC understood fatigue as a complex psychophysiological phenomenon but, unlike stress, fatigue continued to be measured by its effects. Though attempts to find a biological correlate for subjective fatigue states continued well into the late twentieth century, no hormonal marker for fatigue was agreed upon. This thesis traces how models of fatigue shifted over the twentieth century. It examines how and why certain

[112] Interview with Paul White, 17 March 2016. Given the sensitive nature of the material discussed pseudonyms are used throughout this thesis.

conceptualisations of fatigue gained traction and considers how trade unions, workers, airlines, and regulatory agencies sought to exploit the uncertainty of the condition for social, financial, or political gain.

Given the space that pilots inhabited for most of their working day, fatigue posed a significant risk to the safety of the travelling public. The potential for loss of life in accidents was significant. By the mid-1970s commercial aircraft could carry hundreds of passengers and, while air crashes were not common, survival rates were low. Air travel was fast and glamorous but, like the nineteenth-century railway, there was a constant sense of danger and risk of catastrophic disaster.[113] Like railway accidents in the nineteenth century, aircraft crashes embodied contemporary concerns about new technological risks. A resilient image of modern catastrophe, air crashes served as dramatic case studies of modernity's discontents. Throughout the latter decades of the twentieth century, newspaper journalists and other contemporary commentators used civil aviation as a lens through which to examine the impact of broader technological and social changes on human health and happiness. The darkly dystopian documentary *Future Shock*, for example, used images of flight to demonstrate the manner in which human capacity for change was challenged by modern life.[114] Based on a popular book written by American writer and futurist Alvin Toffler (1928-2016), the documentary, first screened in 1972, opened with a shot of a Pan American aircraft touching down and ended with a scene of a Concorde airplane taking

[113] Harrington, 'The Railway Journey and the Neuroses of Modernity'.
[114] Jackson, *Age of Stress*.

to the skies. Were, on-screen narrator Orson Welles (1915-1985) asked, these new technologies always desirable?

The argument, espoused by Toffler and Welles in the 1970s – that travel and the technologies associated with it embodied modern risk – was not novel. Travel had long been associated with both social and personal ailments and was widely taken, to use George Revill and Richard Wrigley's phrasing, as 'evidence of pathology' since the nineteenth century.[115] In the century prior to the release of *Future Shock* the railway was the focal point for Victorian concerns about urbanisation and modernity. Though, as Harrington has suggested, many aspects of industrialisation had inherent dangers, no other technological system required such vast numbers of ordinary people to surrender their safety and security in such a way.[116] Anxieties around railroad accidents manifested in medical diagnoses, most famously as railway spine.[117] Eric Caplan has explained that though the aetiology of the diagnosis shifted over time railway spine was always linked with train travel. Initially the disease was thought to be entirely somatic, the result of spinal damage caused by vibration, but it was later described as a form of psychoneurosis, similar to neurasthenia, caused by the stresses of modern life.[118]

Civil aviation was one of several sites in which fatigue was important in post-war Britain, but it was in many ways a very specific case. Civil aviation saw, undoubtedly, the most potent manifestations of post-war anxiety about fatigue at work. The space that pilots inhabited during their working day was

[115] George Revill and Richard Wrigley, 'Introduction' in Richard Wrigley and George Revill (eds.), *Pathologies of Travel*, (Amsterdam: Rodopi, 2000), pp. 1-24, p. 1.
[116] Harrington, 'The Railway Journey and the Neuroses of Modernity'.
[117] Eric Michael Caplan, 'Trains, Brains, and Sprains: Railway Spine and the Origins of Psychoneuroses', *Bulletin of the History of Medicine*, 69, 3 (1995) 387-419.
[118] Ibid.

conceptually, and physically, peculiar. Twentieth-century British pilots spent much of their working day up to 30,000 feet in the air, flying planes carrying large numbers of passengers. The fatigue of pilots thus had different implications than the fatigue of factory workers, administrators, or steel workers, as it had repercussions for the health and safety of the travelling public. For this reason, it was perceived and managed differently from the fatigue of other workers in the twentieth century. As this thesis will make clear, however, the management of fatigue within civil aviation was not entirely unique. Throughout the century, fatigue was perceived and responded to comparably in the transport sector more broadly and, in the latter decades of the twentieth century, in healthcare circles. Though the physical space inhabited by workers in these occupations was different, worker fatigue was similarly framed as a danger to public safety, whether that was long-haul truck drivers falling asleep at the wheel and endangering other road users, or healthcare professionals inadequately caring for patients as a result of intensive rotas. As such, though a very particular case, flying fatigue can shed light on the perception and management of fatigue in twentieth-century Britain more broadly.

The Body in Flight, the Body at Work: Historiographical Contexts

In recent years fatigue has been examined by a number of organisational psychologists, but there has been very little historical work produced specifically on fatigue in civil aviation.[119] While some military historians have

[119] Narinder Kapur, Anam Parand, Tayana Soukup, Tom Reader, and Nick Sevdalis, 'Aviation and Healthcare: A Comparative Review with Implications for Patient Safety', *Journal of the Royal Society of Medicine Open*, 7, 1 (2016) 1-10, available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4710114/ [last accessed 17 September 2017].

discussed related issues, such as flying stress and the use of amphetamines by Fighter and Bomber Command in the Second World War, there has been no extended discussion of flying fatigue as it affected commercial pilots in the twentieth century.[120]

This chapter has, so far, discussed one of the central contexts of this thesis: industrial fatigue. Much historical research has been done here and, as noted previously, this thesis seeks to extend the story of occupational fatigue told in histories of interwar industrial health by drawing out connections with civil and military aviation.

Given the focus of this thesis, it is important to understand fatigue also in relation to histories of aviation, and histories of occupational health and safety. These historiographical contexts give a sense of the broader significance of flying fatigue in twentieth-century Britain.

Histories of Aviation

Encompassing the use of airplanes in civil and military settings, ballooning, and rocket technology, aviation history has been a popular area of study for several decades.[121] Largely written by aviation enthusiasts until the mid-1980s, aviation history has been dominated by detailed studies of technological development and a narrow focus on key figures, such as Wilbur (1871-1948) and Orville Wright (1867-1912), without much critical analysis of

[120] These histories are discussed in the following section.
[121] For a history of ballooning see: Richard Holmes, *Falling Upwards: How We Took to the Air*, (London: Harper Collins, 2013); for a history of rocket technology see: A. Bodoin Van Riper, *Rockets and Missiles: A Life Story of a Technology*, (Baltimore: Johns Hopkins University Press, 2007).

the economic, social, or cultural implications of aviation.[122] This 'buff' style history has tended to focus narrowly on the national story of either France or America.[123] Such histories were widely criticised from the late-1980s for lacking academic rigour and distance and – in contrast to wider trends within the history of technology – for framing aviation technology as a neutral and autonomous force in history.[124] James R. Hansen led the charge, first articulating a detailed criticism of aviation history in 1989. In an article published in *Technology and Culture*, Hansen called for more attention to be paid to the social and cultural ramifications of aviation. Few works, he argued, looked at the 'social motives, aims, and second-order consequences of the aviation enterprise'.[125] Primarily studied in isolation, Hansen suggested that aviation history had fallen behind other fields of history wherein broadly synthetic, contextual, and interdisciplinary studies looked at the meaning of a particular field of history in terms of what it meant to and for others.[126]

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[122] From the early 2000s some historians criticised this focus on individuals, particularly the Wright brothers. Many attempted to resituate the Wrights within a wider context of aviation invention. For example: Richard Hallion, *Taking Flight: Inventing the Aerial Age from Antiquity through the First World War*, (Oxford: Oxford University Press, 2003); Guillame de Syon, 'What the Wrights Wrought: The Centennial of Flight in Recent Literature', *Technology and Culture*, 45, 2 (2004) 350-357; Deborah G. Douglas, 'The Wright Brothers and the Invention of the Aerial Age', *Technology and Culture*, 45, 2 (2004) 363-367.

[123] For histories of French aviation see: Robert Wohl, *A Passion for Wings: Aviation and the Western Imagination 1908-1918*, (London: Yale University Press, 1994); for histories of American aviation see: Henry Serrano Villard, *Contact! The Story the Early Birds*, (London: Arthur Barker, 1987); from the late 1990s a number of works attempted to provide an international or global perspective, see: Joseph P. O'Grady, 'From Baldonnel to Shannon: Irish Civil Aviation Policy, 1921-1935', *New Hibernia Review*, 1, 4 (1997) 64-80; Anne Nesbet, 'In Borrowed Balloons: The Wizard of Oz and the History of Soviet Aviation', *The Slavic and East European Journal*, 45, 1 (2001) 80-95; Gordon Pirie, 'British Air Shows in South Africa 1932-1933: "Airmindedness", Ambition and Anxiety', *Kronos*, 35 (2009) 48-70; Waqar H. Zaidi, '"Aviation Will Either Destroy or Save Our Civilization": Proposals for the International Control of Aviation, 1920-45', *Journal of Contemporary History*, 46, 1 (2011) 150-178.

[124] Examples of traditional 'buff' histories of aviation include: Villard, *Contact!*; Terry Gwynn-Jones, *Farther and Faster: Aviation's Adventuring Years 1909-1939*, (London: Smithsonian Institution Press, 1991).

[125] James R. Hansen, 'Aviation History in the Wider View', *Technology and Culture*, 30, 3 (1989) 643-656, p. 643.

[126] Ibid.

Although some historians of aviation retained a narrow enthusiasm for their subject, largely unparalleled in other historical fields, since the early 1990s a number of historians have looked to broaden the scope of aviation history, drawing on and incorporating themes from economic history, military history, and cultural history.[127]

Military historians began explicitly investigating issues relating to aviation and the RAF in the 1970s. Early histories of military aviation were primarily concerned with either examining the relationship between the armed forces and the aviation industry or telling the story of fighter pilots involved in World War Two, with a particular focus on those involved in the Battle of Britain.[128] From the early twenty-first century, in line with broader trends in military history towards the health and experiences of individual fighting men and women, a number of historians began exploring military aviation in relation to stress and exhaustion.

Patrick Bishop has suggested that physical exhaustion and psychological distress often went hand in hand, particularly during the Battle of Britain when duty hours were extended from dawn to dusk and pilots were

[127] Robert Wohl is one notable exception. Wohl learnt to fly whilst writing his 1994 publication *A Passion for Wings*, a cultural history of aviation. He championed enthusiasm as a means of understanding early aviators: 'Had I not become a pilot, I would have written a very different book. I think I now understand, even if dimly, what early aviators used to call the "intoxication of flight". It cannot be learned in books.' Wohl, *A Passion for Wings,* p. 3; for examples of the cultural history of aviation see: Douglas, 'The Wright Brothers and the Invention of the Aerial Age'; Martin Francis, 'A Flight from Commitment? Domesticity, Adventure and the Masculine Imaginary in Britain after the Second World War', *Gender and History*, 19, 1 (2007) 163-185; Martin Francis, 'Men and the Royal Air Force, the Cultural Memory of the Second World War and the Twilight of British Empire' in Philippa Levine and Susan R. Grayzel (eds.), *Gender, Labour, War and Empire*, (Basingstoke: Palgrave Macmillan, 2008), pp. 179-196.

[128] For histories of military-industry relations in Germany see: John H. Morrow, *Building German Airpower, 1909-1914*, (Knoxville: University of Tennessee Press, 1976); John H. Morrow, *German Air Power in World War I*, (London: University of Nebraska Press, 1982); bomber pilots received far less scholarly attention in part, according to Patrick Bishop, because of an ethical uneasiness about aerial bombardment, see: Patrick Bishop, *Bomber Boys: Fighting Back 1940-1945*, (London: Harper Perennial, 2008).

only permitted to sleep for four to six hours.[129] Drawing heavily on oral histories and the personal memoirs of flyers, Bishop's *Fighter Boys* points to a two-way relationship between 'deep fatigue' and depression.[130] Fatigue, Bishop argued, affected the mentality of pilots in a number of ways. While some, such as Birdy Bird-Wilson, experienced 'jitters', others felt tearful and isolated.[131] Paul Richey, a pilot involved in the Battle of Britain, described how he 'dared not speak for fear of bursting into tears'.[132] Conversely, psychological distress and fear were primary causes of fatigue for many men who often experienced difficulty sleeping and nightmares related to flying. Both Birdy Bird-Wilson and Paul Richey admitted to suffering from nightmares, indicating the complex interplay between fear, psychological distress, and sleeplessness.

Also interested in sleeplessness, Alan Derickson has described a military-wide preoccupation with stamina, resilience, and alertness in middle and late twentieth-century America. World War Two, he argues, saw a distinct shift in military tactics and warfare. There was a move towards sustained and continuous operations and a trend toward night warfare. Such operations demanded levels of stamina which often exceeded 'the normal limits of human endurance'.[133] Fighting men maintained wakefulness by using chemical stimulants and self-discipline. Derickson argues that the war deepened American society's tendency to 'promote sleeplessness' in two

[129] Patrick Bishop, *Fighter Boys: Saving Britain 1940,* (London: Harper Collins, 2004).
[130] Ibid. p. 211.
[131] Ibid. p. 337.
[132] Ibid. p. 211.
[133] Alan Derickson, '"No Such Thing as a Night's Sleep": The Embattled Sleep of American Fighting Men from World War II to the Present', *Journal of Social History*, 47, 1 (2013) 1-26, p. 2.

ways: it introduced new ways to alleviate fatigue (he dwells, particularly, on the widespread use amphetamines in civil and military settings) and it elevated the value of alertness and stamina by linking these qualities to patriotic sacrifice and gender identity.[134] Fighting men, he argues, often accepted sleep deprivation as it reinforced the cultural values and social practices of hegemonic masculinity. Self-denial of fatigue may, Derickson argues, have played a significant part in the gender expression of American wartime pilots.[135]

Martin Francis, James Pugh, and Mark Jackson have also explored the links between stress, exhaustion, and gender in relation to wartime pilots. Their focus has, however, been predominantly on lifestyle and coping mechanisms. Francis has described a colourful 'off-duty culture' in which aircrew drank alcohol, partied with members of the Women's Auxiliary Air Force (WAAF), and 'ran their fast cars on potentially lethal aviation fuel'.[136] While senior officers occasionally sought to control access to amphetamines or to curtail heavy drinking, according to Francis, they were generally willing to 'indulge their aircrew, providing combat capability was not compromised'. [137] Indeed, he argues, senior army officials recognised that the ability to seek diversion was crucial to flyers' ability to cope with what otherwise would be 'intolerable levels of strain'.[138]

Pugh, on the other hand, has examined how the RAF managed fatigue on an institutional level. Countering Francis, Pugh has argued that the RAF

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[134] Ibid. p. 14.
[135] Ibid.
[136] Martin Francis, *The Flyer: British Culture and the Royal Air Force 1939-1945*, (Oxford: Oxford University Press, 2008), p. 121; Ibid. p. 120.
[137] Ibid. p. 122.
[138] Ibid. p. 122.

approved the use of Benzedrine in 1942 for use on operations by aircrews solely as a means of promoting wakefulness, not as a means of helping flyers to cope with the psychological strain of combat.[139] Finally, Jackson's chapter provides details of the theoretical framework on which senior army officers drew, outlining a number of neuropsychiatric studies of flying stress in men and women from the early twentieth century.[140] Jackson's work, which focuses on men and women in equal measure, is representative of a wider trend in aviation history that has sought to critically examine the place of women in military and civil aviation.

Prior to the 1980s, most scholarship in this area focused exclusively and uncritically on male pilots, flight deck engineers, and early aviation pioneers. The publication of Arlie Russell Hochschild's sociological work on the emotional labour of female cabin staff, *The Managed Heart,* in 1983 encouraged increasing work on female aircrew.[141] A number of popular histories have since examined the role of female pilots in World War Two. Journalists, including Giles Whittell and Jacky Hyams, have written about the role of women in British military organisations including the Air Transport Auxiliary and the WAAF, while historians such as Katherine Sharp Landdeck have written on the experiences of American women in organisations including the Women's Army Corps and the Women's Auxiliary Ferrying

[139] James Pugh, 'The Royal Air Force, Bomber Command and the use of Benzedrine Sulphate: An Examination of Policy and Practice during the Second World War', *Journal of Contemporary History*, (2016) 1-22, available at: https://doi.org/10.1177/0022009416652717 [last accessed 17 September 2017].
[140] Mark Jackson, 'Men and Women under Stress: Neuropsychiatric Models of Resilience during and after the Second World War' in Mark Jackson (ed.), *Stress in Post-War Britain, 1945-85*, (London: Pickering and Chatto, 2015), pp. 111-130.
[141] Arlie Russell Hochschild, *The Managed Heart: Commercialization of Human Feeling*, second edition, (London: University of California Press, 2003), p. 7.

Squadron.[142] A number of historians have also considered the place of women in civil aviation in America and Canada. Scholarship in this area has engaged with three key debates: the public perception and occupational status of female cabin crew, the role and responsibility of trade unions in protecting the health of female workers, and the relationship between female airline work and feminism.

Kathleen Barry historicised the first issue in 2007, following several similarly framed studies by sociologists.[143] Barry argued, in line with preceding works, that as cabin crew work became formally associated with women in the 1930s, female cabin crew came to personify white middle-class ideals of femininity. Throughout the twentieth century female cabin crew were expected to comply with a litany of physical and personal ideals. Women were required to be 'young', 'slender', 'attractive', and unmarried.[144] Until the late-1960s it was common practice for airlines to dismiss female cabin crew upon marriage as managers reasoned that this would detract from their 'devotion to serving passengers', and the physical rigours and long, odd hours of flying would interfere with 'wifely duties at home'.[145]

Some historians have, however, questioned this prevailing narrative. Suzanne Kolm has suggested that although airline work was sometimes described as 'homemaking or hostessing' in the 1960s, from the mid-1970s

[142] Giles Whittell, *Spitfire Women of World War II*, (London: Harper Collins, 2008); Jacky Hyams, *The Female Few: Spitfire Heroines of the Air Transport Auxiliary*, (Stroud: The History Press, 2012); Katherine Sharp Landdeck, 'Experiment in the Cockpit: The Women Airforce Service Pilots of World War II' in Dominick A. Pisano (ed.), *The Airplane in American Culture* (Michigan: University of Michigan Press, 2003), pp. 165-198.
[143] See for example: Roberta Lessor, 'Social Movements, the Occupational Arena and Changes in Career Consciousness: The Case of Women Flight Attendants', *Journal of Occupational Behaviour*, 5 (1984) 37-51.
[144] Kathleen M. Barry, *Femininity in Flight: A History of Flight Attendants*, (London: Duke University Press, 2007), p. 12.
[145] Ibid. p. 25.

the work of cabin crew was rebranded to emphasise the special knowledge and skills of workers, particularly in relation to health and safety.[146] Kolm has compared the occupational status of female cabin crew and nurses, who, she argues, occupied an ambiguous and sometimes 'uncomfortable' position.[147] As on the hospital floor, female cabin crew were in a position 'superior' to the consumers of their service.[148] Cabin crew controlled the aircraft cabin and, just as nurses knew more than most patients about medical conditions and procedures, cabin crew had superior knowledge about aviation technology.

Historians of trade unionism and feminism have supported Kolm's reconceptualisation of female cabin crew. Susan Ware has suggested that although the aviation industry was undoubtedly 'sex-segregated' from the late-1930s, historians and social commentators have 'too starkly' juxtaposed the inclusivity of the 1920s and 1930s, at which time women were free to train as pilots, and the segregation and sexism of the late-twentieth century.[149] Drew Whitelegg has argued that in late-twentieth century America, particularly following the implementation of the Civil Rights Act in 1968, women workers in the aviation industry were in a much more 'powerful' industrial position than popular histories have suggested.[150]

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[146] Suzanne L. Kolm, 'Who Says It's a Man's World? Women's Work and Travel in the First Decades of Flight' in Dominick A. Pisano (ed.), *The Airplane in American Culture,* (Michigan: University of Michigan Press, 2003), pp. 147–64, p. 149.
[147] Ibid. p. 152.
[148] Ibid. pp. 151.
[149] Susan Ware, *Still Missing: Amelia Earhart and the Search for Modern Feminism,* (New York: Norton, 1993), p. 234; Joanne Meyerowitz makes the same argument, more broadly, about post-war American mass culture, see: Joanne Meyerowitz, 'Beyond the Feminine Mystique: A Reassessment of Postwar Mass Culture, 1946-1958', *The Journal of American History*, 79, 4 (1993) 1455-1482.
[150] Drew Whitelegg, *Working the Skies: The Fast-Paced, Disorienting World of the Flight Attendant*, (London: New York University Press, 2007), p. 57.

Although historically male-dominated trade unions had been reluctant to campaign on issues affecting female members, the increasing employment of mostly female flight attendants in the 1970s magnified the bargaining power of female flight attendants. By the 1980s eleven trade unions represented flight attendants in America. Trade unions campaigned, particularly, on issues relating to female health including menstrual irregularities and pregnancy. Andreas Killen has gone so far to suggest that in many ways Canadian female flight attendants led the way for women in the workplace, particularly in the 1970s and 1980s following the formation of Stewardesses for Women's Rights.[151] Drawing on this extensive literature relating to North American flight attendants, this thesis looks to historicise the experiences of flight attendants working for British airlines, who have received little scholarly attention in comparison with their counterparts on the other side of the Atlantic.

Histories of Occupational Health and Industrial Accidents

Occupational diseases and industrial accidents provide, as David Rosner and Gerald Markowitz have suggested, a window into the complex 'interlocking relationships' between employment, business, government, and public health.[152] Over the past thirty years scholarship in this area has engaged with three key issues and debates: job-related ailments caused by specific workplace practices or processes; health and multifactorial illness; and workplace accidents and workmen's compensation.

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[151] Andreas Killen, *1973 Nervous Breakdown: Watergate, Warhol, and the Birth of Post-Sixties America*, (New York: Bloomsbury, 2006).
[152] David Rosner and Gerald Markowitz, *Deadly Dust: Silicosis and the On-Going Struggle to Protect Workers' Health*, second edition, (Michigan: University of Michigan Press, 2006), p. 11.

Early histories of occupational health, written prior to or at the turn of the century, largely focused on job-related illnesses with a specific and recognisable causative agent of disease. Scholarship has centered on two particular diseases: asbestosis and silicosis. Both illnesses were caused by the inhalation of dust containing either asbestos or silica, often took decades to develop, and are assumed to have affected thousands of workers. Historical analysis of these illnesses has revealed a 'culture of disregard for health' in a number of industries.[153] Historians have been critical of both trade unions and medical and public health professionals for failing to raise awareness of the dangers of asbestos and silica, particularly when the full implications of inhaling the substances became clear in the 1950s and 1960s.[154] The most damning criticisms have, however, been reserved for employers. In *Lethal Work*, Ronald Johnston and Arthur McIvor claim that they found 'no evidence' of employers 'pro-actively encouraging health-consciousness' in relation to asbestos.[155] To the contrary, they conclude that:

> The available evidence suggests quite the opposite. Taking short cuts which involved serious health risks in order to maximise production was condoned, even encouraged.[156]

The asbestos industry, according to this analysis, was more concerned with profit than with the health of employees.

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[153] Ronald Johnston and Arthur McIvor, *Lethal Work: A History of the Asbestos Tragedy in Scotland*, (East Linton: Tuckwell Press, 2000), p. 3.
[154] Geoffrey Tweedale, *Magic Mineral to Killer Dust: Turner and Newall and the Asbestos Hazard*, (Oxford: Oxford University Press, 2000).
[155] Johnston and McIvor, *Lethal Work,* p. 215.
[156] Ibid. p. 215.

The past ten years has seen a distinct shift away from these traditional areas of research toward a more inclusive approach. In line with broader historiographical changes, historians of occupational health have moved their focus on disease to health and welfare. These histories, best exemplified by Vicky Long's *The Rise and Fall of the Healthy Factory*, stress the interaction of mind and body, the prevention of disease, and the promotion of mental and physical wellbeing: in short, a more holistic vision of workers' health.[157] Recent histories of occupational health have used the widest possible definition of the workplace and of the work and health relationship, often including an analysis of indirect causes of ill health such as pay, pace of work, and the home life of workers.

Roger Cooter first substantially historicised the last of the issues described above, workplace accidents and workmen's compensation, in the 1990s.[158] Industrial accidents first became a concern in the late nineteenth century, following the factory reforms of the 1830s and 1840s.[159] Prior to this, accidents were usually framed as 'arbitrary and individual happenings' with little or nothing to do with workplace design or processes.[160] For this reason in the nineteenth century British employers often resisted workers' compensation claims. Hazards of the workplace were not, businesses argued, the fault of the employer, so the responsibility for compensating workers following a workplace accident did not lie with them. Following the introduction

[157] Long, *The Rise and Fall of the Healthy Factory.*
[158] For a history of accidents see: Roger Cooter and Bill Luckin (eds.), *Accidents in History: Injuries, Fatalities and Social Relations*, (Amsterdam: Rodopi, 1997).
[159] Jamie L. Bronstein, *Caught in the Machinery: Workplace Accidents and Injured Workers in Nineteenth-Century Britain*, (Stanford: Stanford University Press, 2008).
[160] Roger Cooter, *Surgery and Society in Peace and War: Orthopaedics and the Organization of Modern Medicine, 1880-1948*, (Basingstoke: Macmillan Press, 1993), p. 80.

of the Workmen's Compensation Act in 1897 employers were compelled to compensate injured workers. The growth of statutory compensation for industrial injuries has attracted considerable attention from both historians of labour and historians of state welfare.[161]

Other historians have looked at the prevention of workplace accidents. In *Accident Prone*, John C. Burnham examines accidents and safety management quite broadly, but accidents in the workplace are most prominent.[162] Like Cooter, Burnham argues that accidents were framed in naturalistic terms until the late nineteenth century. The growth of transportation and manufacturing technology, however, provoked attempts to understand and prevent accidents. Unlike their predecessors, researchers and campaigners involved in the early twentieth-century safety movement believed that accidents could be prevented. Four different means of preventing accidents were thought to be effective in different circumstances: safety regulations (whether enforced or voluntary); safety education; the protection of risk groups and accident-prone individuals; and 'engineering out' accidents.[163]

In recent years, the first of these measures – regulation – has received increasing attention from historians. Particularly pertinent to this thesis is Christopher Sirrs' examination of occupational safety and health regulation in twentieth-century Britain.[164] Sirrs' work, which focuses on safety and health in

[161] See P. W. J. Bartrip, *Workmen's Compensation in Twentieth Century Britain*, (Aldershot: Gower Publishing, 1987); Mark W. Bufton and Joseph Melling, '"A Mere Matter of Rock": Organized Labour, Scientific Evidence and British Government Schemes for Compensation of Silicosis and Pneumoconiosis among Coalminers, 1926-1940', *Medical History*, 49, 2 (2005) 155-178.
[162] Burnham, *Accident Prone.*
[163] Ibid.
[164] Sirrs, 'Accidents and Apathy'.

equal measure, marks a break with previous scholarship in this area which, until the mid-2010s tended to consider safety and health separately. This thesis builds on this scholarship by demonstrating that, in some industries, health and safety were intimately linked. In civil aviation, for example, the health and fitness of pilots was crucial for flight safety. If the captain or co-pilot of an aircraft became medically incapacitated during a flight there were serious safety implications. With no access to medical care, and no opportunity to discontinue work, human errors – and air accidents – were likely.

Opening the Hangar Door: Sources and Methodology

This thesis draws on a diverse range of primary source material, including archival records, oral sources, medical and scientific journals, newspaper reports, trade union membership magazines, and the published and unpublished reports and memoranda of regulatory bodies. The combination of sources used varies from chapter to chapter. Chapter Two, which draws primarily on military accounts of flying fatigue, refers mainly to reports and papers produced by the Air Ministry and the Ministry of Defence. It focuses, particularly, on the reports and memoranda produced by the FPRC from 1939, which are, for the most part, housed in The National Archives. Chapter Three also relies heavily on archival material from The National Archives, though the sources used here are mainly those produced by regulatory agencies in the second half of the twentieth century. In addition to drawing on legal publications, I have also used archival material in the form of correspondence, report drafts, and minutes of meetings to trace how and why

various committees made decisions about flight time limitations. Chapter Four draws heavily on media sources, mostly in the form of newspaper reports. As Chapter Four also discusses trade unionism, I have made use of archival material available from the Modern Records Centre relating to the activity of Britain's largest aviation union, the British Airline Pilots Association (BALPA), between 1946 and 2001.

Owing in large part to the archival silences on fatigue as it affected cabin crew, Chapter Five relies largely on oral testimonies. In conjunction with regulatory, sociological, and scientific evidence, oral history is used here to provide new details and perspectives. Oral sources are, of course, 'not *objective*', but robust defences of this methodology over the past thirty years have largely replaced academic scepticism about the historical validity of oral testimony.[165] Oral history can provide material on areas rarely glimpsed in the archives. It has, for this reason, proved popular with historians of sexuality, political violence, and other issues and experiences that are barely represented in the archival record.[166] Here, oral histories revealed more about an issue only alluded to in written records: the unofficial policy of in-seat rest employed by flight deck crew in civil airlines in the twentieth century. As airlines and regulators did not formally endorse in-seat rest in this period, few

[165] Alessandro Portelli, 'What Makes Oral History Different' in Robert Perks and Alistair Thomson (eds.), *The Oral History Reader*, (London: Routledge, 1998), pp. 63-74, p. 70; Katherine Borland, '"That's Not What I Said": Interpretative Conflict in Oral History Research' in S. B. Gluck and D. Patai (eds.), *Women's Words: The Feminist Practice of Oral History*, (New York: Routledge, 1991), pp. 63-75; Paul Thompson, 'The Voice of the Past: Oral History' in Robert Perks and Alistair Thomson (eds.), *The Oral History Reader*, (London: Routledge, 1998), pp. 21-28; Anna Green, 'Individual Remembering and "Collective Memory": Theoretical Presuppositions and Contemporary Debates', *Oral History,* 32, 2 (2004) 35-44.
[166] Kate Fisher, *Birth Control, Sex, and Marriage in Britain 1918-1960*, (Oxford: Oxford University Press, 2006); Emily Bridger, 'From "Mother of the Nation" to "Lady Macbeth": Winne Mandela and Perceptions of Female Violence in South Africa, 1985-91', *Gender and History*, 27, 2 (2015) 446-464.

references to it exist in the official record. Conversations with flight deck crew, both on and off the record, revealed, however, that this practice was widely employed throughout the latter decades of the twentieth century. As Jeffrey Cooper recalled of his time as a flight engineer with BOAC between the 1970s and 1990s: 'oh it was quite common. It was approved really'.[167] Oral histories also proved valuable more broadly. Formal interviews, in addition to the informal exchanges that often accompanied these, allowed me to gauge the prevalence of fatigue, as well as information about how it was managed beyond regulatory purview and subjectively experienced by workers.

Interview participants were recruited from a number of organisations. Former pilots, navigators, and flight engineers were recruited through the British Association of Aviation Consultants, the British Airways Retired Staff Association (BARSA), and the Devon Virtual Jet Centre. Former flight attendants were recruited for interview from both BARSA and the British Airways (BA) Crew online forum, which brings together current and former BA crew members. In total, sixteen participants were interviewed for this thesis: six former pilots, one former flight engineer, and nine former cabin crew members. This occupational categorisation belies a complex reality. Participants sometimes held multiple job roles, or retrained during their career. James Hall, for example, was employed as a navigator before training as a pilot. In other instances, participants also had important roles in regulation, training, or research.[168] Paul White, for example, was seconded to the RAF Institute of Aviation Medicine (IAM) in 1976 to assist and advise on

[167] Interview with Jeffrey Cooper, 24 January 2017.
[168] Interview with James Hall, 30 March 2016.

experimental flying to measure the effects of sleep loss on pilot performance. He then served as a member of the Confidential Human Factors Incident Reporting Programme (CHIRP) from its foundation in 1982 until 1995.[169] Like many of the other participants interviewed for this thesis then, the working identities and experiences of James Hall and Paul White were complex. To interpret the testimony of interviewees based solely on their job role would, thus, be too simplistic. In recognition of this issue I have included, where appropriate, details of participants beyond their primary occupational position. More information about participants is available in the appendix of this thesis.

Given the sensitive nature of the material discussed here – participants sometimes detailed behaviours that may have been subject to sanction during their working life – all digital files and transcripts and have been anonymised and pseudonyms are used throughout this thesis. It is worth noting that for many of the former flight deck and cabin crew consulted for this thesis, the oral history interview – which focused on their working life – required reflection on often-private life events. A number of the participants noted in interview that they were, under usual circumstances, reluctant to discuss their working life. As former cabin attendant Jacob Evans said during interview, in most of his day-to-day conversations he tried 'not to open the hangar door'.[170] Reflecting on his routine exchanges with family, friends, and former colleagues, Evans said:

> We don't make any references at all, we never open the hangar door, and that actually is a part of our lives that is refreshing in many ways

[169] Interview with Paul White, 17 March 2016.
[170] Interview with Jacob Evans, 28 November 2016.

> because we had reached saturation. We'd reached the end completely. So if [former colleagues] come over here, they were with us a couple of nights ago and they didn't leave until two o'clock. We never mentioned aircraft once. And that's the rule. No one opens the hangar door.[171]

The interview encounter was then, as former cabin attendant – and Jacob Evans' wife – Julia Evans said, 'the first time' they had discussed their working lives in years, noting 'we never talk about it individually do we?'[172]

Themes and Chapter Outlines

In seeking to extend the history of workplace fatigue in Britain beyond 1945, this thesis asks four central questions. First, how was flying fatigue defined and explained in post-war Britain? Did fatigue remain tied to performance and productivity, as it had in industrial settings in the nineteenth and early-twentieth centuries? Or was flying fatigue conceptualised and measured in distinctive ways? Second, in what circumstances was flying fatigue deemed important in post-war Britain? Was flying fatigue bound up with concerns about efficiency, as in the interwar period, or did novel problems structure approaches to it? Third, how was flying fatigue managed in the middle and late-twentieth century? Where did responsibility for the avoidance or minimisation of flying fatigue lie: with workers, employers, or regulatory agencies? Fourth, how was flying fatigue conceptualised and experienced by people of the past?

[171] Ibid.
[172] Interview with Julia Evans, 28 November 2016.

My argument can thus be divided, broadly, into four parts. First, I argue that complex and sometimes competing discourses of fatigue persisted throughout the twentieth century. The conceptual apparatus developed by nineteenth and early twentieth-century theorists and interwar and wartime research bodies persisted into the post-war period. Fatigue was imagined – in official circles at least – as a complex psychophysiological phenomenon and, while a number of novel issues, namely circadian dysrhythmia resulting from transmeridian travel, faced civilian airline pilots in the middle and latter half of the twentieth century, in post-war Britain research committees tended to focus on the issues identified as important in the early twentieth century: hours of work and emotional health.

Second, I argue that in the post-war period worker fatigue was reconceptualised as a problem of health and safety. Although concerns about productivity and efficiency persisted until the 1960s, these were largely sidelined in the latter decades of the twentieth century. Worker fatigue instead became bound up with arguments about worker health and public safety. I argue that this post-war refashioning of fatigue largely explains why it remained a pertinent issue in some industries. The connections drawn between fatigue and safety in healthcare and the transport sector transformed fatigue from a problem that affected only workers, to one that had consequences for the broader populace. This change had implications for how fatigue was managed at work, and how responsibility for ensuring that worker fatigue did not endanger members of the public was distributed.

I argue, third, that in the middle and late twentieth century responsibility for managing fatigue at work was consistently located beyond the state. The

work and rest of flight deck and cabin crew was more strictly regulated than in any other industry in post-war Britain, but these regulations consistently located the responsibility for fatigue management with individual workers and employers rather than state agencies. Though the fatigue of airline pilots was framed as a barrier to flight safety throughout the century, economic and administrative concerns took priority.

Fourth, I argue that worker experiences of fatigue were not always consonant with research findings. The issues that research bodies deemed most important were not always reflected in the lived experiences of crewmembers. Throughout the century airline pilots and cabin crew attributed fatigue to causes other than long working hours and emotional labour. They were, as Chapter Five demonstrates, much more likely to attribute fatigue to circadian dysrhythmia. The dissonance between how research bodies and workers imagined fatigue was but one manifestation of broader tensions between research and practice in twentieth-century civil aviation. As this thesis will demonstrate, though civil aviation is often hailed as a research-led industry, throughout the century regulations and policies pertaining to the rest and working practices of aircrew were consistently based on a common-sense 'instinctive feel', rather than the findings of independent research bodies.[173] Most of the historical work described so far has focused almost entirely on intellectual and institutional research and responses to fatigue. As this thesis will demonstrate, however, fatigue was also a social issue and, though it is important to investigate the ways in which it was conceived of by academic

[173] Patrick Mitchell, *Safer Care: Human Factors for Healthcare Trainer's Manual,* (Argyll and Bute: Swan and Horn, 2013), p. viii.

bodies, regulatory agencies, and government organisations, it is also revealing to examine the ways in which fatigue was discussed and managed through informal interpersonal channels. This thesis uses oral histories to understand the ways in which tiredness at work was experienced and managed by historical actors.

With multiple overlapping and intersecting themes, the history of flying fatigue in Britain eludes a straightforward chronological narrative. An effort has been made, though, to retain a sense of chronology by grouping chapters. Chapters One and Two provide the early history of fatigue. The focus here is on medical and scientific discourses in the first half of the twentieth century. Chapters Three and Four examine the immediate post-war period until the early 1980s, with a particular focus on the introduction of a new regulatory framework for the avoidance of fatigue in the mid-1970s. The focus here is on trade union and labour politics as much as medicine. Chapter Five moves the discussion on to workers, with a particular focus on the 1980s and 1990s.

Chapter Two begins with the early military history of flying fatigue. Flying fatigue was first defined as a discrete, and pressing, issue during World War Two. Chapter Two argues that the models of fatigue, and the practices employed to prevent and alleviate it, between 1939 and 1945 were firmly established by the end of the war. When, in the 1960s, civil aviation expanded and former RAF pilots sought employment with commercial airlines, the established military discourses and practices relating to the fatigue of pilots were transferred to a civil setting. As subsequent chapters demonstrate, this relationship persisted through the middle and late twentieth century and, as a

result, paramilitary attitudes continued to dominate discussions about fatigue and working practices in civil aviation long after the close of the Second World War.

Chapter Three demonstrates the close relationship between military and civil circles most explicitly. With a particular focus on the regulation of aircrew schedules, this chapter shows that a number of the regulatory bodies and advisory committees that produced guidelines and legislation in relation to fatigue management and working hours in the middle and late twentieth century had strong connections with the RAF. Some, such as the Bader Committee, contained members who had previously flown for the RAF. Others, such as CHIRP, were explicitly embedded within the RAF IAM. Chapter Three charts the evolution of regulations governing aircrew schedules in post-war Britain. It argues that, in spite of the fact that pilot fatigue was framed as a safety issue throughout the century, regulations were largely permissive. In line with broader trends towards self-regulation in the middle and late twentieth century, airlines and pilots – rather than state regulators – were charged with taking responsibility for the prevention of fatigue.

Chapter Four acts as a counterpoint to Chapter Three. It explores many of the same themes – including risk, responsibility, and regulation – but does so from a perspective of union-airline bargaining. Chapter Four argues that fatigue was prioritised by aviation unions in their negotiations with employers because, given its nebulous nature, it allowed unions to campaign for economic, social, health, and safety objectives simultaneously. This chapter charts how BALPA, Britain's largest aviation union, negotiated with

airlines on issues of working hours, productivity, and scheduling, paying particular attention to the Association's provocative public relations campaign in the early 1970s.

The final chapter, Chapter Five, investigates the ways in which fatigue was experienced and managed in quotidian contexts. It examines, in particular, crew relations prior to the introduction of CRM training in the mid-1990s. Extending the remit of this thesis beyond structural and personal narratives here I argue that, though regulatory policy focused on individual and company-centered strategies for the avoidance of fatigue, throughout the twentieth century crew-wide coping mechanisms were integral to the management of fatigue in flight. Drawing on a rich base of oral testimonies, I argue that these, largely informal, solutions relied on good relations both within and between the flight deck and the cabin.

Finally, in a short concluding chapter, I suggest avenues for future research. Given the on-going unrest related to the introduction of new junior doctors' contracts, it is evident that further research on fatigue and burnout among medical practitioners is warranted. Examining the historical roots of the current conflict may help to inform present-day debate and policy relating to the regulation of working hours and the wellbeing of healthcare workers.

The avenues for further research outlined in Chapter Six give a sense of the limitations of this thesis, which will also be considered here. The restrictions of this work fall into two main areas. First, the thesis focuses quite narrowly on airline pilots and flight attendants. Other occupations are considered briefly – the medical profession, for example, is consistently cited as a point for comparison – but little is said, for instance, about fatigue in

relation to other safety critical industries and occupations including, for example, the work of air traffic controllers. The rationale for this relates to the availability of primary source material. Simply put, this thesis engages with a substantial body of previously under or unused material from military research committees, aviation unions, and regulatory agencies. To do this rich source material justice, a narrow focus on the aviation industry was adopted. Building on this industry-specific work, a broader history of occupational fatigue in Britain now needs to be undertaken to see if the conclusions reached here are unique to civil aviation or more broadly generalisable.

Second, this thesis offers only a limited discussion of scientific and medical discourses after the close of the Second World War. For the most part this thesis is concerned with policy and practice. This is not to suggest that fatigue became divorced from its scientific context in the post-war period. Indeed, scientific and medical research into flying fatigue continued apace throughout the middle and late twentieth century, as Chapters Two, Four, and Five note. The FPRC continued to research fatigue in laboratory and operational contexts into the 1970s under the leadership of Hugh Patrick Ruffell Smith (1911-1980). Research was also carried out at the RAF IAM and, on the other side of the Atlantic, by the National Aeronautics and Space Administration (NASA).

The focus on policy and practice is, in part, a corrective. Much historical scholarship on fatigue and the science of work focuses exclusively on medical and scientific discourses, but fatigue also has a rich history beyond this context, which this thesis draws out. This does, however, mean that this thesis privileges certain medical models of fatigue over others. This

thesis traces the ways in which the models of fatigue developed by industrial and military research bodies in the first half of the twentieth century endured into the post-war period. As such, it focuses mostly on psychological malaise, physical exhaustion, and acute fatigue (or 'accident-proneness' as it was referred to in wartime psychological literature). Discussions of boredom, anticipatory stress, and cumulative fatigue associated with health risks, are largely absent. Likewise, little is said about circadian disruption. To be clear, these models of fatigue did penetrate aviation medicine in the twentieth century. Importantly for the purposes of this thesis, though, they did not inform policy or practice. Regulators, workers, and trade unions alike were dissatisfied with medical research in the post-war period. The precise physiological mechanism of fatigue remained contested, so the functional model of fatigue developed during wartime continued to structure discussions about working practices beyond the laboratory. Though medical research in this area continued to be commissioned by airlines and regulators into the late-twentieth century, continuing uncertainty about the biological reality of fatigue meant that, in policy settings, medical voices were muted.

The development of scientific and medical understandings of flying fatigue in post-war Britain is, unquestionably, a history that needs to be written. Though this thesis gives a sense of medical and scientific changes, a broad history of fatigue research in the twentieth century, building on and complementing nineteenth and early-twentieth century histories of industrial fatigue, now needs to be written.

2

Flying Fatigue During and After World War Two

Planes were first utilised by the British military in World War One. Military air services then expanded significantly in the 1920s and 1930s.[1] In the interwar period military planes were, increasingly, technically sophisticated and aircraft carriers, a major innovation in fleet operations, became commonplace.[2] The growth of military aviation had implications for both military strategy and civilian experiences of war. From 1940 an increasing number of military operations relied heavily on British airpower, most notably the Battle of Britain.[3] Fighter pilots thus became essential to military strategy. Bomber pilots were also granted an increasingly central position in the Royal Air Force (RAF), although their role is often played down in histories of military aviation.[4] By the early years of the Second World War, then, airpower was central to the British war effort. It was in this context that the fatigue of pilots was first deemed important. Though flying fatigue was first identified as a discrete issue by interwar researchers, wartime concerns about manpower

[1] Roger E. Bilsten, *Flight in America: From the Wrights to the Astronauts*, (Baltimore: Johns Hopkins University Press, 2001).
[2] Ibid.
[3] Patrick Bishop, *Fighter Boys: Saving Britain 1940,* (London: Harper Collins, 2004).
[4] A small number of academic histories have been published on the subject of wartime bombing offensives since the turn of the century, many of which focus on civilian experiences of aerial bombardment, see for example: Hew Strachan, 'Strategic Bombing and the Question of Civilian Casualties up to 1945' in Paul Addison and Jeremy A. Crang (eds.), *Firestorm: The Bombing of Dresden, 1945*, (London: Pimlico, 2006), pp. 1-17; Patrick Bishop, *Bomber Boys: Fighting Back 1940-1945*, (London: Harper Perennial, 2008); Juliet Gardiner, 'The Blitz Experience in British Society 1940-1941' in Claudia Baldoli, Andrew Knapp, and Richard Overy (eds.), *Bombing States and Peoples in Western Europe 1940-1945*, (London: Continuum, 2011), pp. 171-183; Richard Overy, *The Bombing War: Europe 1939-1945*, (London: Allen Lane, 2013).

economy and wastage prompted intensive research into the causes, signs, and means of managing fatigue in airmen. From 1939, the Flying Personnel Research Committee (FPRC) carried out much of this research. Composed of clinicians, psychologists, and physiologists – many of whom had served on industrial fatigue research committees prior to the outbreak of war – the FPRC advised the Air Ministry on matters relating to operational inefficiency in military aircrew. It is, in part, for this reason that this chapter focuses largely on FPRC records. There is, however, a second reason: that the FPRC had an enduring post-war legacy that stretched beyond the military into the civil sector.

This chapter examines fatigue and flying stress in military aviation, and establishes the importance of wartime debates and explorations of fatigue for the post-war period. It details both how fatigue came to be problematised specifically in relation to flying, and how concerns with, definitions of, and techniques for assessing fatigue moved from military to civil settings. It is structured in two parts. The first begins with a discussion of flying stress and the place of fatigue in interwar and wartime theories of neuropsychiatric resilience and disorder, but focuses primarily on the period when flying fatigue was subject to most research: 1942-1945. It demonstrates that during this period a complex discourse of flying fatigue existed. While some researchers argued, in line with interwar theories of flying stress, that fatigue was a primarily psychological phenomenon, others looked to working hours and physiology, citing long flying hours and the intensification of wartime operations as the cause of pilot fatigue. In order to explore these different discourses in detail, psychology and physiology are discussed separately

here. To be clear, this separation is, to some extent at least, arbitrary. There was no clear-cut boundary, in that researchers rarely endorsed a solely psychological or physiological model of fatigue. Reflecting a broader contemporary discourse about the relationship between emotions and physical health promoted by British and American physiologists such as George Crile (1864-1943), Walter Cannon (1871-1945), and James Lorimer Halliday (1897-1983), British military researchers often acknowledged the importance of both psychological and physiological factors in the aetiology and management of fatigue.[5] I argue here, that while the precise nature and mechanism of fatigue was subject to debate in this period, an essential model of fatigue emerged. In this period fatigue was increasingly conceived of in functional terms. In some instances fatigue was discussed in relation to accuracy and flying efficiency, in others it was considered in relation to sleep and wakefulness.

The second part of the chapter examines flying fatigue in civil aviation. It argues that wartime research and policies informed post-war approaches to fatigue in civilian airlines. A close relationship existed between civil and military aviation. Throughout the twentieth century there was a two-way exchange of research, ideas, and personnel between civil and military settings. Wartime military research and policies pertaining to flying fatigue were transferred into civil settings in the post-war period. Although, as the following chapters lay out, wartime military research and practices did not go

[5] Mark Jackson, 'Perspectives on the History of Disease' in Mark Jackson (ed.), *The Routledge History of Disease*, (London: Routledge, 2017), pp. 1-18; Rhodri Hayward, 'Enduring Emotions: James L. Halliday and the Invention of the Psychosocial', *Isis*, 100, 4 (2009) 827-838; Otniel E. Dror, 'From Primitive Fear to Civilized Stress: Sudden Unexpected Death' in David Cantor and Edmund Ramsden (eds.), *Stress, Shock, and Adaptation in the Twentieth Century*, (Rochester: University of Rochester Press, 2014), pp. 96-120.

uncontested, the essential model of flying fatigue that first emerged during the Second World War persisted into the post-war period.

As this chapter will demonstrate, this model of fatigue built on the concept of industrial fatigue developed in the nineteenth and early-twentieth centuries. As in pre-war discourses, fatigue was closely tied to performance. While industrial fatigue was framed in relation to productivity and output, flying fatigue came to be configured in relation to manpower economy and flight safety. This chapter, then, suggests that a performance model of fatigue dominated wartime research and policy. This argument is at odds with military historiography in this area, which largely frames fatigue in relation to sleeplessness. Historical preoccupations with Benzedrine, this chapter will argue, have obscured concerns about performance and efficiency, that dominated both wartime and post-war discussions of flying fatigue.

Fatigue and Flying Stress in Military Aviation

Much of the academic research that discusses flying fatigue does so in relation to military aviation. Though the literature on flying fatigue in the British military is sparse, there are some clear historiographical trends. Scholars have broadly focused on the categorisation of fatigue and the use of Benzedrine. A powerful stimulant with the ability to promote both wakefulness and wellbeing, Benzedrine was approved for use in Britain's RAF in November 1942. Historians disagree on whether its primary purpose in this context was psychological or physiological. Implicit in this disagreement is a debate about the nature of flying fatigue. Few academic histories have explicitly examined fatigue in relation to wartime flying but in many instances

Benzedrine has been used as a conduit for discussion of flying fatigue. As such, my analysis here focuses in on histories of Benzedrine and what these reveal about historians' thoughts on flying fatigue more broadly.

There are two clear camps within the existing historiography, with Martin Francis and Nicolas Rasmussen on one side and James Pugh on the other. Both published in 2008, Francis's *The Flyer* and Rasmussen's *On Speed* present a similar picture of Benzedrine use in the RAF during the Second World War. Though both Francis and Rasmussen concede that, officially at least, Benzedrine was distributed to flyers in the RAF and the Women's Auxiliary Air Force (WAAF) to alleviate fatigue, they argue that the substance was most valued for its effect on mood and behaviour. Benzedrine, they argue, was approved for use in the RAF in 1942 because it raised morale, helped flyers deal with 'intolerable levels of strain' and made crews more willing to work.[6] The stimulant was distributed for its 'consciousness-altering properties', rather than as a means of allaying the effects of physiological fatigue.[7] Implicit in this argument about Benzedrine use is a comment on the nature of fatigue. To be clear, neither Francis or Rasmussen deny the physical effects of fatigue, but their accounts suggest that between 1939 and 1945 the British military was more interested in the psychological components of fatigue.

Pugh challenged this account in a series of articles published in 2016 and 2017 on the use of Benzedrine in the Royal Navy and the RAF.[8]

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[6] Martin Francis, *The Flyer: British Culture and the Royal Air Force 1939-1945*, (Oxford: Oxford University Press, 2008), p. 122.
[7] Nicolas Rasmussen, *On Speed: The Many Lives of Amphetamine*, (London: New York University Press, 2008), p. 71.
[8] James Pugh, '"Not… like a rum-ration": Amphetamine Sulphate, the Royal Navy and the Evolution of Policy and Medical Research During the Second World War', *War in History*,

Benzedrine, according to Pugh, was not primarily used to help with the psychological strain of combat. Benzedrine use was, rather, limited to helping personnel at risk of falling asleep as a result of lengthy or intensive operations. Though conceding that the Air Ministry was concerned about the psychological strain placed on aircrew, he argues that these issues were managed separately, namely by the promotion of exercise and good diet and by the provision of recreation facilities. For Pugh, Benzedrine was utilised to help with a relatively narrow aspect of the fatigue problem: the unpredictability of sleeplessness. The Air Ministry's advice about Benzedrine was cautious. It was intended for use, Pugh argues, only in exceptional circumstances where the benefits of wakefulness outweighed the dangers associated with the drug. For Pugh, then, wartime flying fatigue was a physiological phenomenon centred on the problem of sleeplessness.

Complicating the above histories, Mark Jackson has argued that Benzedrine was used to 'enhance mood and performance and to maintain energy'; suggesting that wartime flying fatigue was multifaceted, involving both psychological and physiological components.[9] With a specific focus on the records of the FPRC this chapter argues, in line with Jackson, that a complex, and contested, psychophysiological model of fatigue emerged in the first half of the twentieth century. Here I argue that there was a gradual shift from emotional explanations of fatigue in the interwar period and early years

(2017) 1-22, available at: https://doi.org/10.1177/0968344516643348 [last accessed 17 September 2017]; James Pugh, 'The Royal Air Force, Bomber Command and the use of Benzedrine Sulphate: An Examination of Policy and Practice during the Second World War', *Journal of Contemporary History*, (2016) 1-22, available at: https://doi.org/10.1177/0022009416652717 [last accessed 17 September 2017].

[9] Mark Jackson, 'Men and Women under Stress: Neuropsychiatric Models of Resilience during and after the Second World War' in Mark Jackson (ed.), *Stress in Post-War Britain, 1945-85*, (London: Pickering and Chatto, 2015), pp. 111-130, pp. 116-117.

of the Second World War towards interest in the physiology of fatigue and 'mechanical factors' from 1942, though this was not straightforward.[10] Indeed, in most cases fatigue was recognised to be complex and multifaceted, bridging the mind-body binary in a way that many other wartime conditions did not. Finally, I argue that this complex understanding of flying fatigue as both physical and mental persisted in the post-war years in civil aviation but that another, functional, conceptualisation of flying fatigue – as accident proneness – came to dominate regulatory and trade union discourses.

Flying Stress in Interwar Britain

Flying fatigue was not a novel concept in World War Two. Researchers first discussed the fatigue of military pilots in the interwar period. Fatigue, interwar researchers argued, affected pilot performance and was, as such, a 'highly important' problem that required investigation. In a 1935 address to the United Services section of the Royal Society of Medicine, which was later printed in the *Journal of the Royal Army Medical Corps*, Air Commodore A. V. J. Richardson explained this rationale:

> When we consider that the fundamental peculiarity of combatant service in the air lies not so much in the fact that the air is not the natural element of man, but rather in the fact that flying demands and encourages a degree of individualism unknown in any other branch of the Services, the matter of fatigue in aircraft crews becomes highly important. This is especially the case when we see that aircraft of today

[10] Wellcome Library (hereafter referred to as WL) PP/HEW/L.7/6: Institute of Aviation Medicine Report 615, 'British Aviation Medicine During the Second World War, Part 5: Fatigue, Flying Stress and Accidents', 1982, p. 2.

> are tending more and more to strain the human element by the increase in their performance.[11]

Given the independence of military flight, fatigue, Richardson argued, had a bearing on the 'continuance of air-efficiency' and was, for this reason, under investigation by the RAF.[12] Fatigue, Richardson suggested, resulted from a combination of physical, physiological, and psychological factors including poor aircraft design, cold and 'oxygen want', and prolonged 'mental stress'.[13] It could not, however, be separated from the 'deeper psychological problems' that affected service personnel.[14] Richardson's discussion of fatigue here is representative of a broader contemporary project to investigate the relationship between fatigue, stress, and psychological disorders in aircrew. Indeed, in the interwar years fatigue was considered both a symptom of flying stress and, in some instances, a cause of psychological disturbance.

The concept of flying stress appeared for the first time in the writings of British military physicians in 1920. As Jackson has suggested, like its 'terrestrial counterpart' shell shock, flying stress was thought to be the product of mental strain, sleeplessness, fatigue, and fear.[15] Exhaustion was a primary component of the diagnosis and, as such, the term 'flying stress' was used interchangeably with terminology that foregrounded fatigue, such as 'aviators' neurasthenia' and 'flying fatigue'.[16] It is unclear who first introduced the

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[11] A. V. J. Richardson, 'Efficiency of Personnel in the Services', *Journal of the Royal Army Medical Corps*, 66, 1 (1936) 14-20, p. 17.
[12] Ibid. p. 17.
[13] Ibid. p. 17; Ibid. p. 18.
[14] Ibid. p. 17.
[15] Jackson, 'Men and Women under Stress', p. 115.
[16] The National Archives (hereafter referred to as TNA) AIR 57/9: Squadron Leader D. D. Reid, 'FPRC Report 450: A Study of Some Factors in the Causation of Flying Stress', June 1942, p. 1.

concept of flying stress. Some historians have suggested that James L. Birley (1884-1934), the Chief Medical Officer for the RAF first theorised the concept.[17] A number of near-contemporary sources suggest, however, that Martin Flack (1882-1931), a senior RAF researcher who became Director of Research for the RAF Medical Service after the First World War, first coined the term.[18]

Birley and Flack had very different explanations of how flying stress was caused. According to Flack, the breakdown associated with flying stress resulted from changes to the pilot's respiratory and cardiovascular systems. These physiological changes, he argued, were caused by the environmental conditions of operational flight, the most important of which was altitude.[19] Changes to the respiratory system as the result of flying at high altitudes caused, according to Flack, deficient oxygenation (anoxia) of the body which, in turn, led to feelings of fatigue and mental strain.[20] As Squadron Leader Donald Darnley Reid (1914-1977), a Bomber Command Medical Officer in the Second World War, noted in 1942, Flack's explanation of flying stress was deemed unsatisfactory by many contemporary researchers and medical officers.[21]

Birley's concept of flying stress, which foregrounded emotions and temperament, was, however, widely accepted. Birley's model of flying stress emphasised situational determinants and the role of temperament and emotional reactivity in shaping men's resilience and ability to fly well under

[17] Jackson, 'Men and Women under Stress'.
[18] TNA AIR 57/9: Reid, 'FPRC Report 450'.
[19] TNA AIR 57/8: C. P. Symonds, 'FPRC Report 412: Memorandum on the Use and Abuse of the Term "Flying Stress"', 1941.
[20] TNA AIR 57/9: Reid, 'FPRC Report 450'.
[21] Ibid.

wartime conditions. Informed by the works of Sigmund Freud (1856-1939), William H. R. Rivers (1864-1922), and Walter Cannon, Birley's theory emphasised the role of instinct, the interaction between environment and individual psychology, and the physiology of emotions.[22] According to Birley, in many ways flying stress was a 'perfectly normal reaction to a very abnormal environment'.[23] Given the physical and psychological strain of wartime flying, some level of stress, he argued, was to be expected in all men although some individuals may be more constitutionally susceptible to 'mental shock' than others.[24] Birley concluded that the RAF should only recruit men who were psychologically suited to military service, and should – once men were recruited – ensure that all flyers were adequately prepared for combat.[25] Birley's sentiment was not shared by all, but his recommendations were broadly instituted by the RAF throughout the 1920s and early 1930s.

Flack and Birley died in 1931 and 1934 respectively. Their deaths occasioned a shift in RAF policy with regards to flying stress, and military psychology more broadly. Allan D. English has suggested that the removal of two of the RAF's most experienced physicians 'created a void', which a number of psychologists and neuropsychiatrists filled.[26] One of the most influential RAF appointments following the deaths of Birley and Flack, was Frederic Bartlett (1886-1969). Chair of Experimental Psychology at the University of Cambridge, Bartlett's work extended Birley's theory of flying stress. Giving greater weight to individual temperament than Birley, Bartlett

[22] Jackson, 'Men and Women under Stress'.
[23] Ibid. p. 115.
[24] TNA AIR 57/8: Symonds, 'FPRC Report 412', p. 1.
[25] Allan D. English, 'A Predisposition to Cowardice? Aviation Psychology and the Genesis of "Lack of Moral Fibre"', *War and Society*, 13, 1 (1995) 15-34.
[26] Ibid. p. 19.

argued that failure to adapt to military life was caused by temperamental weakness.[27] He argued that 'weaklings' should not be permitted to fly in the RAF and that only men with the strength of will to resist mental breakdown should be recruited.[28] According to Jackson, this position dominated Air Ministry advice to medical officers responsible for the health and fitness of pilots throughout the interwar years.[29] In 1939 Bartlett was appointed as a founding member of the FPRC. Though his early research had focused on flying stress, Bartlett's research for the FPRC focused mainly on fatigue as it related to performance.

From 1939 two other researchers – Charles Symonds (1890-1978) and Denis J. Williams – became the RAF's foremost advisors on flying stress. Unlike Bartlett, Symonds and Williams were not based at the University of Cambridge's Psychological or Physiological Laboratories. Differing from many of their colleagues at the FPRC, Symonds and Williams had military backgrounds. Symonds had served with the Royal Flying Corps (RFC) during the 1914-1918 war and acted as a consultant neurologist to the RAF from 1934. He was then commissioned as Group Captain on 11 September 1939, just after the outbreak of war.[30] Williams, on the other hand, held the rank of Squadron Leader. Symonds and Williams' military employment history influenced their understanding of fatigue and flying stress. They drew, unlike many of their colleagues at the FPRC, on the intellectual traditions established by military researchers in the interwar years and continued to

[27] Jackson, 'Men and Women under Stress'.
[28] Allan D. English, *Cream of the Crop: Canadian Aircrew, 1939-1945*, (London: McGill-Queen's University Press, 1996), p. 67.
[29] Jackson, 'Men and Women under Stress'.
[30] Ibid.

propagate an understanding of fatigue that foregrounded situational determinants and the emotional reactivity of personnel.

Flying Stress and Psychological Disorder

Flying fatigue became an increasingly important object of concern for the military during the Second World War, bringing to bear new priorities and forms of assessment. Though researchers remained divided over the causes and effects of fatigue, Symonds and Williams confidently situated it alongside other forms of psychological disorder. Psychological stress, rather than individual temperament, were emphasised here. Influenced by the reports of Medical Officers and Squadron Leaders, this discourse afforded external and environmental factors considerable aetiological importance, and thus regulatory solutions for the problem of fatigue came to fix on living and working conditions. These interests, however, only lasted until the middle of the war, when new requirements reframed fatigue in terms of wakefulness.

The FPRC, formed in January 1939, was a body composed of military and civilian experts whose duty was to investigate and advise the Air Ministry on matters affecting the safety and efficiency of military flight. The Committee was composed of clinicians, psychologists, physiologists, and members of the RAF including General Duties Branch officers and the Director General of the RAF Medical Services. Between 1939 and 1945 the Committee produced over 600 reports on issues relating to vision, aircrew selection, the impact of age on flying ability, and the effects of fatigue and strain on flying personnel.[31]

[31] A. D. Harris and O. L. Zangwill, 'The Writings of Sir Frederic Bartlett, CBE, FRS: An Annotated Handlist', *British Journal of Psychology*, 64, 4 (1973) 493-510; WL PP/HEW/F.4/1 Letter to Sir Harold Whittingham from Air Commodore Consultant in Neuro-Psychiatry, 18 December 1942.

In April 1942 Symonds and Williams published a report on psychological disorders in flying personnel.[32] The report reviewed the interwar literature on flying stress in light of the reports of psychological disorder submitted to the Air Ministry since the outbreak of war in 1939 and drew on the views of contemporary Medical Officers. The report began with a discussion of nomenclature. Referring to an earlier FPRC report by Symonds on the uses and abuses of the term 'flying stress', the report outlined the terms used by contemporary medical officers to refer to psychological disorders in flying personnel.[33] According to Symonds, RAF medical officers used a variety of terms – including 'flying stress', 'fatigue syndrome', and 'acute pilot's fatigue' – to refer to mental disorder.[34] These various terms were used, according to Symonds, to suggest the existence of psychiatric disturbance 'without introducing the term neurosis'. Though medical officers recognised neurotic symptoms in flyers they were disinclined to use familiar psychiatric labels, for fear of stigmatising men who had contributed to the war effort. As Symonds and Williams described in the report:

> The tendency to invent new terms for neurosis in flying personnel is due largely to the desire, especially on the executive side, to avoid for the man who has often achieved much, or at any rate has done his best, any appellation which would class him as 'neurotic'.[35]

[32] TNA AIR 57/8: C. P. Symonds and Denis Williams, 'FPRC Report 412(d): Investigation into Psychological Disorders in Flying Personnel: Review of Reports Submitted to the Air Ministry Since Outbreak of the War', April 1942.
[33] TNA AIR 57/8: Symonds, 'FPRC Report 412'.
[34] TNA AIR 57/8: Symonds and Williams, 'FPRC Report 412(d)', p. 1.
[35] Ibid. p. 1.

The aforementioned terms were used in the stead of more widely recognised psychiatric labels – such as neurasthenia – but were, as Edgar Jones has suggested, essentially psychiatric diagnoses.[36] Such terms did not imply unwillingness to work or moral deficiency, as in the contemporary classification Lack of Moral Fibre (LMF), and as such attracted popular sympathy and carried an entitlement to a war pension.[37] The report argued that, in this sense, the ambiguity of the psychiatric nomenclature used in the RAF was favourable, despite the 'great confusion' this sometimes entailed.[38]

The report concluded that psychological disorders in airmen had both endogenous and exogenous causes. Symonds and Williams suggested that, after predisposition, fatigue and fear constituted the two most potent causes of psychological disorder. Fatigue was caused, they argued, by a number of factors including inadequate leave and recreation facilities, poor living conditions, inadequate sleeping and sanitary arrangements, and long operational hours. The report ended with a number of recommendations for the reduction of psychological disorders in airmen, based on the surveyed literature. The report had five key recommendations. First, that an operational limit should be fixed to a maximum number of sorties and that this should be known to flyers. Second, that leave should be known and fixed beforehand. Three conditions, the report argued, were essential in planning leave: 'that the man should anticipate his leave well in advance, that it should be regular and, that it should be brief'.[39] Third, the report argued that recreation facilities

[36] Edgar Jones, '"LMF": The Use of Psychiatric Stigma in the Royal Air Force during the Second World War', *Journal of Military History*, 70, 2 (2006) 439-458.
[37] Ibid.
[38] TNA AIR 57/8: Symonds and Williams, 'FPRC Report 412(d)', p. 2.
[39] Ibid. p. 21.

should be available at every unit, and that the Medical Officer should use these spaces as a means of getting to know flying crews personally. Symonds and Williams maintained, as Birley had, that it was the Medical Officer's duty to recognise aircrew fatigue and to prescribe rest prior to physical or psychological breakdown, so that flyers could adequately recover and be returned to duty in a short time. Fourth, the report argued that deep shelters should be provided for sleeping quarters to ensure that flyers could secure adequate sleep undisturbed from the noise of active combat. Finally, the report recommended that aircrew should live at base without their wives and families. As Francis has noted, in many cases RAF wives lived adjacent to the bases on which their husbands were stationed. Francis has suggested that wives and families offered flyers emotional support that was otherwise unavailable. They offered, he has argued, a 'vital antidote' to the dehumanising consequences of military discipline and the violence of combat.[40] Symonds and Williams's April 1942 report, however, contended that families could also be a source of stress. Living with or in proximity to families, the report concluded, introduced domestic anxieties and lowered morale.[41]

Following the publication of the report in April 1942, Symonds and Williams were asked to undertake further research on the effects of flying stress and fatigue on service personnel. Two further studies were commissioned: one centred on Fighter Command, the other on Bomber Command. Both investigations were directed by Harold Whittingham (1887-

[40] Francis, *The Flyer*, p. 12.
[41] TNA AIR 57/8: Symonds and Williams, 'FPRC Report 412(d)'.

1983), the RAF's Director General of Medical Services, and were based entirely on interviews with Squadron Commanders and Medical Officers. The investigators visited operational stations personally and conducted interviews privately. Interviewees were asked two broad questions: 'What are the things which get people down?' and 'How do you tell when a man has had enough?'[42] The final reports, both published in August 1942, contained a number of verbatim quotes from interviewees.

The reports were structured in two parts. The first part, entitled 'The Effects of Flying Stress', noted the signs indicating the effects of stress, the role of the Medical Officer in detecting these effects, and thoughts on the imposition of an operational limit and relief employment. According to Symonds and Williams, the signs indicating the effects of flying stress included: changes in appearance, a loss of keenness for flying duties, a 'falling off in flying performance or operational efficiency', alcoholic excess, and fatigue.[43] Echoing the conclusions of earlier Air Ministry studies, both the Fighter Command and Bomber Command reports suggested that the Medical Officer should play a key role in the detection of flying stress. As one General Duty Officer put it, Medical Officers occupied a unique social position within the station that should be utilised to its fullest advantage:

> The Medical Officer has the advantage that he can mix unofficially with the pilots and can find out what personal troubles they have … The Medical Officer becomes of great value therefore in giving all sorts of information to the Squadron Commander – exactly the things we want

[42] TNA AIR 57/8: C. P. Symonds and Denis Williams, 'FPRC Report 412(e): Investigation of Psychological Disorders in Flying Personnel: Personal Investigation in Fighter Command', August 1942, p. 2.
[43] Ibid. p. 5.

> to know. They would not tell us these things because they are afraid they might be put off an operation.[44]

Medical Officers, the reports argued, should informally socialise with flyers as a means of identifying men who were temperamentally unfit for service or who were psychologically unstable.

The reports also detailed the opinions of interviewees on the measures currently in place to relieve excessive stress and fatigue: namely the existence of an operational limit and the arrangement of relief employment. Almost all of the General Duty and Medical Officers interviewed were in favour of a limit of some sort, though few expressed approval of the 200-hour limit that had been in place since 1940.[45] Some interviewees suggested that the limit should be more flexible, to take account of individual capacity for strain. The imposition of an arbitrary scheme was, the authors argued, wasteful in two respects:

> Men with high endurance are taken off when they are of great and increasing value; and men of low endurance have to go beyond their breaking point so that there is little or no chance of their returning for a second tour.[46]

Other interviewees argued that an arbitrary limit was preferable, as it alleviated responsibility from Squadron Commanders. As Symonds and Williams noted in the report produced on Bomber Command:

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[44] Ibid. p. 8.
[45] John Terraine, *The Right of the Line: The Role of the RAF in World War Two*, (Barnsley: Pen and Sword Military, 2010).
[46] TNA AIR 57/8: Symonds and Williams, 'FPRC Report 412(e)', p. 10.

> Not only does it remove great responsibility from his [the Squadron Commander's] shoulders, but it helps in handling those who are sub-standard. It also provides a measure of safety, for some Commanders find it impossible to assess a man's capacity, and some men do not show that they have passed their peak until they have deteriorated greatly.[47]

For these reasons, Symonds and Williams concluded, an arbitrary limit on operational hours was ultimately necessary in some form. The Air Ministry formalised a new system of rules relating to the operational limit the following year. In a letter of 8 May 1943, the Air Ministry formally laid this out:

> Bomber Command: first tour, thirty sorties; second tour, not more than twenty sorties.
> Pathfinder Force: a single continuous tour of 45 sorties.
> Fighter Command:
> Day Fighters: normal maximum 200 hours.
> Night Fighters: 100 hours or maximum of eighteen months.
> Army Cooperation Command: 200 hours.
> Coastal Command:
> Flying boats and four-engined land-plane crews: 800 hours.
> Twin-engined general reconnaissance squadrons (including meteorological squadrons and flights): 500 hours.
> Photographic Reconnaissance squadrons: 300 hours.
> Fighter, torpedo and other squadrons employed offensively: 200 hours.[48]

[47] TNA AIR 57/8: C. P. Symonds and Denis Williams, 'FPRC Report 412(f): Investigation of Psychological Disorders in Flying Personnel: Personal Investigation in Bomber Command', August 1942.
[48] Terraine, *The Right of the Line,* p. 527.

Though opinion diverged about the nature of an operational limit for flyers, most interviewees were in agreement about the limited benefits of relief employment. Most of the Medical Officers and Squadron Commanders interviewed for the reports criticised the present arrangement of posting flyers at Operational Training Units (OTU) for six-month periods to instruct new recruits. While some argued that placement outside the operational setting for such long periods was detrimental to the 'offensive spirit' of flyers, the most common criticism of the policy related to fatigue and overwork.[49] Interviewees drawn from both Fighter and Bomber Command argued that, though placement at an OTU was generally seen as a 'rest' or 'relief' from operational duties, this was inaccurate.[50] Though relief employment offered some respite from 'nervous tension', many interviewees argued that the amount of work expected of personnel at OTUs was greater than in operational situations, thus inducing physical fatigue.[51] One Squadron Commander, drawing on his own experience of relief employment, said that for men who were temperamentally unsuited to teaching, work at an OTU could be both mentally and physically draining: 'I went to an OTU and was dead tired in no time'.[52]

The second part of the reports presented interviewees thoughts on 'the load'. In line with interwar stress theorists, such as Cannon and Crile, for Symonds and Williams 'the load' referred to the 'external pressures' to which pilots were subjected.[53] For Symonds and Williams, flying stress was the result of the 'total sum of all those factors which together make up the load of

[49] TNA AIR 57/8: Symonds and Williams, 'FPRC Report 412(e)', p. 10.
[50] TNA AIR 57/8: Symonds and Williams, 'FPRC Report 412(f)', p. 12.
[51] Ibid. p. 12.
[52] Ibid. p. 12.
[53] Mark Jackson, *Age of Stress: Science and the Search for Stability*, (Oxford: Oxford University Press, 2013), p. 126.

mental and physical strain imposed upon a man by flying under war conditions'.[54] When the load was 'too heavy for a man to carry', fatigue resulted.[55] Though Nick Chapman has suggested that the term 'the load' was mostly used to refer to Bomber Command in other wartime psychological literature, Symonds and Williams used the term in both reports.[56] Reflecting interwar theories of flying stress, a number of interviewees argued that fatigue significantly added to the stress of operations. Some suggested that fatigue was largely a result of physical discomfort, 'caused by unsuitable seats, [and] poorly fitting goggles or masks'.[57] In the report published on Fighter Command, two Squadron Commanders particularly emphasised the design-related causes of fatigue, as Symonds and Williams noted:

> Both mentioned twisting about in the cockpit to look round as a cause of physical strain. It is to be remarked, however, that one was older than the average pilot and had suffered a physical injury which would certainly add to the strain, and the other was a fat type who when encumbered with flying kit might well find it hard work to perform this manoeuvre.[58]

Other interviewees suggested that domestic stress contributed to fatigue. In line with their previous report, Symonds and Williams argued that domestic factors including financial worries, precipitated fatigue: 'The wives worry and

[54] TNA AIR 57/8: Symonds and Williams, 'FPRC Report 412(e)', p. 1.
[55] Ibid. p. 1.
[56] Nick Chapman, 'Bearing the Load: A Fresh Approach to Bomber Command', in Claus-Christian W. Szejnmann (ed.) *Rethinking History, Dictatorship and War: New Approaches and Interpretations*, (London: Continuum, 2009), pp.161-174.
[57] TNA AIR 57/8: Symonds and Williams, 'FPRC Report 412(f)', p. 19.
[58] TNA AIR 57/8: Symonds and Williams, 'FPRC Report 412(e)', p. 14.

transfer their worry to the husbands during leave or in letters'.[59] Others suggested that good relations between crewmembers and between pilots and managers were important for the avoidance of fatigue. Good leadership was thought to be vital in reducing 'the load'. Squadron leaders should, interviewees suggested, praise both successes as well as 'brave failures' in an attempt to maintain the morale of crews.[60] Confidence in other crewmembers was also important in the avoidance of fatigue, particularly in Bomber Command. As Symonds and Williams put it: 'If a man is weak but is an accepted member of the crew the rest will nurse him along'.[61]

Most interviewees, however, suggested that intensive working practices were the primary cause of fatigue.[62] As one Medical Officer put it, the spacing of operational effort was the central issue. Reflecting theories about the relationship between rhythm, energy expenditure, and fatigue, propagated by the Industrial Fatigue Research Board (IFRB) in the interwar period, one Medical Officer argued:

> Fatigue is an important adverse factor and is largely physical. This is not due to the length of the trips, but to the uneven rhythm of sleep and feeding during operational periods.[63]

In ordinary circumstances the weather spaced operational effort so that fatigue did not arise, but in instances where effort was concentrated fatigue was likely to develop and adversely impact operational effectiveness. In a

[59] TNA AIR 57/8: Symonds and Williams, 'FPRC Report 412(f)', p. 31.
[60] Ibid. p. 26.
[61] Ibid. p. 23.
[62] Ibid. p. 19.
[63] Ibid. p. 19.

similar vein, another interviewee argued that missions should be spread according to difficulty:

> It is of great psychological importance that a crew who have had a series of attacks on heavily defended targets should have a chance or two over easy targets before going back to the stiffer job.[64]

If bomber squadrons were required to partake in too many difficult missions in quick succession they were, another argued, likely to 'get tired' and not 'find the target'.[65] The benefits of spacing operational effort were, Symonds and Williams thus concluded, both psychological and physiological.

Echoing the recommendations of the Director General of Medical Services in the previous report published in April 1942, Symonds and Williams argued that the most important factors affecting a man's ability to manage stress and fatigue were extrinsic. Though the constitution of the man was deemed important, external factors such as recreation and leave were most heavily emphasised by interviewees. Of the eighty-two Squadron Commanders and Medical Officers interviewed from Fighter Command, over half emphasised the importance of recreation and time off. A number of interviewees argued that days off were best spent away from base. One Squadron Commander revealed that he sent flyers to a country house or hotel over twenty miles away so that they would 'feel freer and relax better'.[66] Several interviewees suggested that release days of this kind were only useful

[64] Ibid. p. 25.
[65] Ibid. p. 25.
[66] TNA AIR 57/8: Symonds and Williams, 'FPRC Report 412(e)', p. 20.

if they were fixed in advance, in the main so men could 'indulge in an alcoholic party without restraint'.[67] As one interviewee put it:

> A release day to be any good must be fixed beforehand. It enables a man to have a party the night before and know he won't be flying. The worst thing in the world is to be told you are going to have a day off and then have to go flying with a hang-over.[68]

Interviewees argued that excessive consumption of alcohol as a means of relaxation, when combined with 'enough leave', allowed men to 'go on alright'.[69] For this reason senior officers rarely sought to 'curtail heavy drinking' among crews. Generally, they were willing to 'indulge their aircrew', providing that combat capability was not compromised.[70] It was, as Francis has shown, recognised that the ability to seek diversion was crucial to flyers' ability to cope with what otherwise would be unendurable levels of stress.[71]

The reports produced by Symonds and Williams in August 1942 marked the end of FPRC research into flying stress. RAF policy, and consequently FPRC research, shifted rapidly in this period.[72] Interwar theories of flying stress that recognised the complex interplay between fatigue, fear, and morale were replaced by a discourse that focused to a greater degree than ever before on flying efficiency. Faced with a manpower crisis the RAF became increasingly fixated on performance. In this context, fatigue was reconceptualised in functional terms. In some circles it became framed

[67] Ibid. p. 20.
[68] Ibid. p. 20.
[69] Ibid. p. 21.
[70] Francis, *The Flyer*, p. 122.
[71] Ibid.
[72] Pugh, 'The Royal Air Force, Bomber Command and the use of Benzedrine Sulphate'.

specifically in relation to performance decrement, while in others research centred on the problem of wakefulness.

Fatigue and Performance Decrement

Rationalisations of medical procedures and practices to enable military efficiency can be traced at least as far back as the Napoleonic Wars, but it was above all during the First World War that these processes became manifest. Out of mounting concerns with efficiency and wastage, the medical repair of soldiers came to occupy a central position in military strategy.[73] The physical and mental health of troops was seen as essential to the prosecution of a war which, despite 'many technological advances', relied heavily on manpower.[74] As manpower became increasingly scarce in the latter years of the war, the British military looked to maximise the efficiency of personnel in a number of ways.[75] Although some attention was paid to general factors affecting morale, such as diet and living conditions, greatest emphasis was placed on the curative, and to a lesser extent the preventative, power of medicine. Mark Harrison has suggested that medicine contributed to manpower economy in a number of ways. Sanitary arrangements, personal cleanliness, and inoculation against diseases prevented the loss of thousands of men through sickness. Indeed, the 1914–18 war was the first conflict in which deaths from battle injuries exceeded those from disease. Improved curative and rehabilitation facilities similarly returned many injured men to

[73] Roger Cooter, 'Medicine and Modernity', in Mark Jackson (ed.), *The Oxford Handbook of the History of Medicine*, (Oxford: Oxford University Press, 2011), pp. 100-116.
[74] Mark Harrison, *The Medical War: British Military Medicine in the First World War*, (Oxford: Oxford University Press, 2010), p. 2.
[75] Ibid.

duty.[76] Deemed crucial to the military's 'manpower problem', by the close of the war in 1918 medicine had become, as Roger Cooter has described, fundamental to military efficiency and strategy.[77]

Military interest in manpower economy and efficiency became even more pressing during the Second World War. According to Alan Derickson, the 1939-1945 war marked a 'decisive moment' in modern warfare.[78] Although some prior conflicts, including the First World War, had required combatants to maintain efficiency and alertness for extended periods, World War Two marked a trend toward night warfare, extended engagement, and restless movement. Beyond strategic and tactical calculations, technological advances made in the interwar years promoted exhausting battles and made human endurance a major operational constraint. Aircraft, ships, and other types of mechanised vehicles could operate for lengthier periods than was possible in prior wars, and the invention of radar and other imaging and communications technologies facilitated night-time operations.[79] During the 1939-1945 war aerial bombing raids routinely lasted up to eighteen hours; naval vessels often commenced amphibious assaults in the predawn hours; and protracted tank battles were undertaken. World War Two was, then, the first 'around-the-clock' war in which fighting men and women were expected to maintain alertness and efficiency for extended periods without rest.[80]

[76] Ibid.
[77] Cooter, 'Medicine and Modernity', p. 108.
[78] Alan Derickson, '"No Such Thing as a Night's Sleep": The Embattled Sleep of American Fighting Men from World War II to the Present', *Journal of Social History*, 47, 1 (2013) 1-26, p. 2.
[79] Ibid.
[80] Ibid. p. 2.

Following the Battle of Britain in October 1940 – the first major campaign to be fought entirely by air forces – increasing attention was paid to the effects of pilot fatigue by military researchers. This was increasingly so from 1942, as senior RAF commanders became seriously concerned with manpower economy. According to Pugh a number of hard campaigns had been fought in 1942. These campaigns saw heavy losses and widespread failure to hit targets, and the close spacing of missions placed a significant burden on squadrons. Moreover, from April 1942 bomber pilots generally flew alone, following a decision to abandon the inclusion of second pilots in heavy bombers as a result of the strain on the RAF's training establishment. As such, from April bomber pilots were generally without respite during operations.

Under significant strain the RAF was compelled to make the most of its human resources, and in this context the alleviation of physiological fatigue was invaluable.[81] As Bartlett noted in August 1942, fatigue was a concern for the RAF because operational flight required constant vigilance:

> He [the pilot] must remain mentally alert because the signals for every movement he makes come from changes in the instrument panel or in the outside world which have to be noticed and assessed as soon as they occur. He must also keep physically alert … because all these signals must be met with smoothly executed, accurately timed, and co-ordinated bodily movements.[82]

[81] Pugh, 'The Royal Air Force, Bomber Command and the use of Benzedrine Sulphate'
[82] TNA AIR 57/9: F. C. Bartlett, 'FPRC Report 488: Fatigue in the Air Pilot', August 1942.

Fatigue – with its implications for pilot alertness and bodily coordination – was, thus, considered to be a potential problem and, as such, was increasingly researched by the FPRC as an issue distinctive from flying stress.

Between April and December 1942, a number of reports were produced examining the relationship between fatigue, alertness, and pilot performance. Marking a break with previous military fatigue research, which had relied largely on expert testimony, a number of the studies carried out in 1942 drew on experimental evidence, as in the science of work tradition. This is likely at least in part because a number of FPRC researchers, including Bartlett, had been involved in experiments of this kind in the interwar years. Indeed, a number of the researchers seconded to the FPRC during the 1939-1945 war had previously investigated industrial fatigue under the direction of the IFRB or the National Institute of Industrial Psychology (NIIP). Even in instances when researchers had not formally served on industrial fatigue boards, they were likely familiar with the research such committees produced due, in part, to the wide dissemination of IFRB and NIIP research papers within academic circles. The location of research studies was also a factor here. As noted in the introduction to this thesis, much of the research undertaken for the IFRB and NIIP was carried out at the University of Cambridge's Psychological and Physiological Laboratories. Almost all the experiments undertaken on behalf of the FPRC were also carried out in these laboratories and it is likely that FPRC researchers located here were familiar with the work of their colleagues.

The FPRC studies carried out by Bartlett and others in 1942 sought to quantify the physiological state of pilots by technological means beyond the laboratory. Much like the physiological research carried out at high altitudes in the nineteenth and early twentieth centuries, these studies rejected straightforward laboratory investigations of fatigue. Vanessa Heggie has noted in the case of Everest that projects of this kind decentred the laboratory as a site of knowledge production.[83] Unlike high altitude experiments, though, for the most part FPRC researchers rejected the 'natural laboratory': operational aircraft.[84]

Simulator studies were instead prioritised for flying fatigue research.[85] Unlike operational flight, simulators allowed for ready quantification. The Cambridge Cockpit, designed by Kenneth Craik (1914-1945) of the University of Cambridge Psychology Laboratory, recorded, for example, the movement of controls for analysis after the fact.[86] The object, according to Craik, was to 'simulate the behaviour of standard blind-flying instruments and the movements of controls required to carry out manoeuvres in the air, and to record the subject's response in detail'.[87] The movement of the instruments was recorded graphically. As Craik noted in the first FPRC report produced on the apparatus, the physical record of pilot performance consisted of 'four

[83] Vanessa Heggie, 'Experimental Physiology, Everest and Oxygen: From the Ghastly Kitchens to the Gasping Lung', *British Journal for the History of Science*, 46, 1 (2013) 123-147.
[84] Ibid. p. 125; an exception here is Ronald Winfield, who accompanied Coastal and Bomber Command crews on sorties to observe first-hand the effects of Benzedrine on the onset of fatigue. Winfield's studies are discussed later in this chapter.
[85] TNA AIR 57/9: D. Russell Davis, 'FPRC Report 486: Experiments on Mental Fatigue in the Silloth Trainer', August 1942; TNA AIR 57/9: Bartlett, 'FPRC Report 488'; TNA AIR 57/10: The Cambridge Psychological Laboratory RAF Research Group, 'FPRC Report 529(f): A First Report on the Harrogate Investigation', November 1944; TNA AIR 57/10: D. Russell Davis, 'FPRC Report 530: Behaviour of Neurotic Subjects in the Cambridge Cockpit', May 1943.
[86] TNA AIR 57/2, K. J. W. Craik, 'FPRC Report 119: Fatigue Apparatus', March 1940.
[87] TNA AIR 57/2, Craik, 'FPRC Report 119', p. 1.

pencil lines and a central datum line on paper moving at four feet three inches per hour'.[88] Though simple, this provided, as D. Russell Davis, of the Psychology Laboratory at the University of Cambridge, noted, a measure of flying fatigue that – for the first time – 'could readily be scored'.[89]

As Bartlett described in an obituary notice preceding a posthumous collection of Craik's essays, this apparatus revolutionised the study of mental and physical fatigue in aviation. It moved, for the first time, beyond the simple laboratory and factory studies of fatigue privileged by industrial fatigue research committees in the interwar years:

> For some time I had been trying to think how the conventional laboratory procedure for the study of fatigue might be supplemented in certain ways, perhaps improved. The common methods, based upon an investigation of simple and relatively isolated muscular and mental processes, seemed to me so devised that practically only three types of result could be recorded accurately: the amount of deterioration of work, checks and spurts in work, and the final collapse of work. I thought something was needed which would show clearly and exactly how skill, long continued, may change and perhaps disintegrate.[90]

Bartlett asked Craik to design an 'experimental cockpit' that could accurately record these changes and he 'jumped at the idea'.[91] By early 1940 the apparatus was complete and FPRC researchers began using it in studies of fatigue and neuropsychiatric resilience. The Cambridge Cockpit, which Craik

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[88] Ibid. p. 4.
[89] D. Russell Davis, 'The Disorganization of Behaviour in Fatigue', *Journal of Neurology, Neurosurgery and Psychiatry*, 9, 1 (1946) 23-29, p. 23.
[90] Frederic Bartlett, 'Obituary Notice', in Kenneth J. W. Craik, *The Nature of Psychology: A Selection of Papers, Essays and Other Writings by the Late Kenneth J. W. Craik*, (Cambridge: Cambridge University Press, 1966), p. xvi.
[91] Ibid. p. xvi.

originally termed the 'Fatigue Apparatus', made it possible, as Bartlett described in 1966, to 'submit highly complex bodily and mental processes to exact and illuminating measurement'.[92]

The FPRC reports produced using the Cambridge Cockpit and other similar apparatus suggested that fatigue affected a pilot's ability to perform in a number of ways. A 1940 report published by G. C. Drew suggested that, when fatigued, pilots lowered their standards:

> Subjects set themselves a progressively easier task as they get tired; they are satisfied with wider and wider approximations to the true position of the needles. When they are fresh, the side-slip needle is regarded as being satisfactorily central if it fluctuates within two to three degrees each side of the vertical. As fatigue develops … the 'correct band' of the instrument is unconsciously widened from two or three degrees each side of the vertical to five degrees, and then ten degrees, until ultimately, when the subjects are really fatigued, the needle is allowed to swing from side to side and is regarded as being perfectly satisfactory.[93]

In addition to setting themselves 'progressively easier' tasks, tired pilots also, according to Drew, increasingly split the task of flying into its 'component parts' as a means of simplifying the process:

> The fatigued pilot will not look at his panel as a whole. He will instead make whichever of the conventional movements to correct that kind of situation which first occurs to him.[94]

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[92] Ibid. p. xvii.
[93] TNA AIR57/3: G. C. Drew, 'FPRC Report 227: An Experimental Study of Mental Fatigue', December 1940, p. 11.
[94] Ibid. p. 11; Ibid. p. 14.

Later FPRC researchers noted that, when fatigued, accuracy decreased and pilots were likely to experience behavioural changes. They were, for example, increasingly likely to show signs of irritation. In a report published in April 1942 Davis summarised the behavioural changes attributable to fatigue as such:

> The first sign to appear was generally … an awareness of increasing difficulty in controlling the trainer, and this was projected into the machine and was in four subjects accompanied by irritability. There were some examples of forgetfulness of things that had to be done occasionally. These changes are attributed mainly to an inability in the fatigued state to attend to all the various aspects of the task and to concentrate upon one aspect, upon which difficulty is temporarily projected.[95]

At the most basic level, Davis argued in an article published in the *Journal of Neurology, Neurosurgery, and Psychiatry* in 1946, fatigue resulted in a 'disorganization of skilled activities'.[96]

The investigations undertaken using the Cambridge Cockpit and other simulators warned, particularly, of a phenomenon known as 'end deterioration' in which pilots made an increasing number of errors towards the end of a flight. As Bartlett noted in a report published in August 1942:

> When a tired man knows he is nearing home there is an almost irresistible tendency to relax. The crisis is past, the dangerous period apparently over, and unless he takes special care, he will go slack.[97]

[95] TNA AIR 57/9: Davis, 'FPRC Report 486'.
[96] Davis, 'The Disorganization of Behaviour in Fatigue', p. 23.
[97] TNA AIR 57/9: Bartlett, 'FPRC Report 488', p. 5.

The apparent effect of end deterioration was, in some cases, 'enormous'.[98] Drew estimated in 1940 that, for example, the phenomenon caused between 150-200% deterioration in timing. End deterioration was a particular concern for flyers in Bomber Command, who were at risk of being shot down over Axis-held territories following bombing operations.

In April 1942 Bartlett, in a seminal study of flying accidents, argued that human error was the cause of most air crashes. He claimed that:

> Without exception every serious and prolonged investigation of flying accidents that has ever been made has come to the conclusion that a very large number of such accidents are due to mistakes made by the pilot or by some other member of an air-crew.[99]

It seemed likely, he argued, that around 70% of air accidents in wartime were attributable to human error. One of the major causes of human error, according to Bartlett, was skill fatigue. Reid echoed Bartlett's sentiments in a report published in September 1942.[100] According to Reid, fatigue was one of many causes of 'accident proneness'.[101] This, he argued, was a major concern as failure to correctly respond to mid-air emergencies could have 'fatal results in aerial warfare'.[102] As an RAF Institute of Aviation Medicine

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[98] TNA AIR57/3: Drew, 'FPRC Report 227', p. 10.
[99] TNA AIR 57/9: F. C. Bartlett, 'FPRC Report 447: Some Notes on the Investigation of Flying Accidents', April 1942, p. 1
[100] G. Rose, 'Biography: Professor D. D. Reid', *Journal of Epidemiology and Community Health*, 32, 4 (1978) 229-234.
[101] TNA AIR 57/10: Squadron Leader D. D. Reid, 'FPRC Report 508: The Influence of Psychological Disorder on Efficiency in Operational Flying', September 1942, p. 11; Reid's use of the term 'accident proneness' here refers to the likelihood of an accident occurring, rather than the propensity for certain groups of people to be involved in accidents. For a history of the concept of psychophysiological proneness to risk and accidents, see: John C. Burnham, *Accident Prone: A History of Technology, Psychology, and Misfits of the Machine Age*, (Chicago: University of Chicago Press, 2009).
[102] TNA AIR 57/10: Reid, 'FPRC Report 508', p. 11.

(IAM) report put it in 1982: 'To lose highly trained aircrew because of enemy action was one thing; to lose aircrew because of mistakes was entirely another.' [103] For the RAF air accidents were a tragic, and unacceptable, waste of men and machines.

Fighting Fatigue: Wakefulness and Physiology

Following the publication of these reports in 1942, FPRC researchers increasingly turned their attention to the management of fatigue in flight. It was generally agreed that prior methods of alleviating fatigue – namely the movement of pilots out of the line of duty, often to an OTU, for a rest – was no longer possible, given the pressing nature of concerns about manpower economy.[104] Research focused instead on quick and easy ways of mitigating the effects of fatigue. Though the performance decrement model of fatigue remained important here, in some of these studies fatigue was framed in terms of sleepiness. Much of this FPRC research focused on the maintenance of wakefulness. FPRC researchers investigated a number of different ways of alleviating fatigue in flight including the consumption of vitamins, sugar, and caffeine, but from 1940 research interest centred on the benefits and potential pitfalls of amphetamines.

Benzedrine, by far the most widely investigated amphetamine by the FPRC, generated interest in medical and lay circles. Touted as a miracle drug, the benefits of amphetamines, such as Benzedrine, were widely documented in the public domain both prior to and during the Second World

[103] WL PP/HEW/L.7/6: Institute of Aviation Medicine Report 615, p. 1.
[104] Bishop, *Fighter Boys.*

War.[105] Discussion of the drug appeared in the public domain through newspaper reports throughout the 1939-1945 war. According to Sam Goodman, many reports emphasised Benzedrine's 'stamina-enhancing qualities' and its apparent ability to combat fatigue.[106] The drug also made appearances in popular fiction, most notably the James Bond series. After one particularly arduous mission in *Live and Let Die*, Bond credited the ingestion of Benzedrine as the mechanism that prevented him from losing consciousness as a result of extreme pain and fatigue.[107]

First synthesised in the late-nineteenth century in the form of nasal inhalers to treat respiratory difficulties, the stimulating properties of amphetamines were widely recognised by the early-twentieth century.[108] The stimulating effect of amphetamines, and their success at relieving fatigue, placed the drugs, as a 1947 advertisement for Methedrine suggested, 'in an exceptional position in general therapeutics'.[109] They were prescribed for a number of ailments in which fatigue played a part, including depression and disorders of the central nervous system.[110] From the 1930s there were increasing concerns about unregulated access to and indiscriminate use of amphetamines. Benzedrine tablets were placed on the Poisons List in January 1939. Amphetamine use was not, however, stigmatised in the same manner as other drugs, such as cocaine.[111] Pugh has suggested, however,

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[105] Pugh, 'The Royal Air Force, Bomber Command and the use of Benzedrine Sulphate'.
[106] Sam Goodman, 'Thrills, Spills and Pills: Bond, Benzedrine and the Pharmacology of Peace', *Medical Humanities*, 36 (2010) 27-30, p. 29.
[107] Ibid.
[108] Ibid.
[109] WL WF/M/PL/197: 'For mental depression Tabloid Methedrine', 1947.
[110] Goodman, 'Thrills, Spills and Pills'; Benzedrine was also sometimes used to treat morphine addiction, see: H. Cecil Duckworth, 'Benzedrine in Treatment of Morphine Addiction', *British Medical Journal*, 2, 4166 (1940) 628-9.
[111] Pugh, 'The Royal Air Force, Bomber Command and the use of Benzedrine Sulphate'.

that broader lay acceptance of amphetamines was not reflected in the RAF's approach to the drug, which was cautious throughout the period. Indeed, Benzedrine was not officially sanctioned for use by aircrews on operations until November 1942.[112]

German use of the stimulant drug Pervitin during the summer of 1940 drew attention to the potential use of Benzedrine in the British armed forces.[113] International news media reported on the provision of the methamphetamine Pervitin to German pilots.[114] Media outlets reported that it imbued German fighters with courage and allowed them to work for long periods of time, for example during Blitzkrieg, without the need for sleep.[115] As Pugh has suggested, however, RAF interest in amphetamines preceded this. Indeed, the Air Ministry sought advice from the Director General of Medical Services in August 1939 regarding the use of stimulants, and Benzedrine was cleared for use by aircrew in exceptional circumstances at this time.

Sustained research on the drug, however, only began in 1941. In May of that year Bartlett was asked to review the existing literature on Benzedrine, with a view to providing recommendations relating to its safety, dosage, and frequency of use. Bartlett found that, though Benzedrine did not improve performance, it did have an important effect in terms of sustaining both wakefulness and interest in the task at hand. His 1941 report concluded that Benzedrine thus had a role to play in preventing the degradation of

[112] Ibid.
[113] Ibid.
[114] Norman Ohler, *Blitzed: Drugs in Nazi Germany*, trans. Shaun Whiteside, (London: Allen Lane, 2016).
[115] Stephen Snelders and Toine Pieters, 'Speed in the Third Reich: Methamphetamine (Pervitin) Use and a Drug History from Below', *Social History of Medicine*, 24, 3 (2011) 686-699.

performance as a result of fatigue, but argued that it should not be considered as a substitute for sleep.[116] He also concluded that, wherever possible, the administration of the drug should be subject to strict medical control and, because of the subjectivity of its action, flyers should take a test dosage on the ground prior to using it on operations. The publication of these cautious, but positive, recommendations was followed by a number of operational trials.

Initial operational trials were scheduled to take place in Coastal Command where intensive maritime patrol operations were commonplace. Ronald Winfield, an RAF Medical Officer who worked closely with the FPRC, undertook the research. Winfield's 1941 report concluded that Benzedrine was best used in aircraft where sleep was impossible, for example in the aircraft types used by Coastal and Bomber Commands. Though pharmacology was only one strand of his investigation – he also emphasised the important role of diet and ergonomics – the report recommended Benzedrine for use in certain circumstances.[117] In September 1942, Winfield published a further report based on twenty operational sorties with Bomber Command. As in the previous study, Winfield accompanied crews on sorties 'in order to observe the effects of the drug on the onset of fatigue'.[118] Winfield found that, while crews of both Coastal and Bomber Commands experienced fatigue, the signs and causes of fatigue were different. He argued that, while in Coastal Command fatigue was caused by 'the boredom of long hours of uneventful flight', flyers in Bomber Command faced different challenges.[119]

[116] Pugh, 'The Royal Air Force, Bomber Command and the use of Benzedrine Sulphate'.
[117] Ibid.
[118] TNA 57/9: Wing Commander R. Winfield, 'FPRC Report 493: The Use of Benzedrine to Overcome Fatigue on Operational Flights in Bomber Command', September 1942, p. 5.
[119] Ibid. p. 2.

For bomber aircrews the drivers of fatigue were tension, excitement, and relief. It was, according to Winfield, in the final stages of flight that the 'objective and subjective signs of fatigue' became noticeable:

> This relaxation begins before any member of the crew can afford to slacken, and probably causes the loss of many crews because of failure to take sufficient care while danger is still very real. The feeling of relief after leaving the target area gives such a false sense of security that it is frequently difficult to believe that the enemy coast over which one passes on the way home is the same as that which one regarded with such apprehension and suspicion only a few hours before, although the same coastal defences, flak ships, and concentrations of high fighters lie in wait for the unwary. The use of any drug to restore mental alertness is therefore of great value.[120]

Echoing the sentiment of Bartlett's August 1942 report, which emphasised the 'irresistible tendency' for tired flyers to relax and become sleepy as they neared home, Winfield concluded that it was on the return leg of the journey that Benzedrine would be of most use to pilots.[121] In other words, Benzedrine would be most useful, according to Winfield, as means of ensuring pilots remained awake and alert during the return flight. It was along such lines that Whittingham, the RAF's Director General of Medical Services, recommended the approval of Benzedrine for use by aircrews in an operational context in November 1942.

Following the implementation of this policy a number of FPRC reports called for greater caution. One report, produced by Flight Lieutenant R. C.

[120] Ibid. p. 2.
[121] TNA AIR 57/9: Bartlett, 'FPRC Report 488', p. 5.

Browne, argued that Benzedrine did not, as Winfield had claimed, improve the performance of bomber pilots and in some instances pilots were 'worse after it'.[122] As such, in 1943 the Air Ministry issued further guidance relating to the use of Benzedrine in operational settings. In a pamphlet on the prevention of fatigue first circulated in June 1943, the Air Ministry called for a cautious approach to Benzedrine.[123] Though Benzedrine was useful in staving off sleepiness, the pamphlet stated, after a time it diminished one's desire to work and sleep, and could lead to long-term sleep decrement. More concerning, the pamphlet argued however, were the effects Benzedrine had on mood and performance:

> Benzedrine has the effect of causing the individual to feel on top of things and able to carry on with his duties without rest: he feels that he is doing well, when in fact he is making all sorts of mistakes. Whatever danger there is in the tired state is then apt to become greater, not less.[124]

Far from supporting the wellbeing agenda suggested by Francis and Rasmussen, or for that matter the wakefulness benefits suggested by Pugh, the Air Ministry cautioned against the use of amphetamines. Benzedrine, the Air Ministry argued, had dangerous effects on mood and subjective assessment of performance, though it could help with wakefulness it made human error more likely. As such, the Air Ministry advocated that Benzedrine

[122] TNA AIR 57/10: Flight Lieutenant R. C. Browne, 'FPRC Report 507: Benzedrine and the Beam Approach', December 1942, p. 3.
[123] TNA AIR 2/14723: Air Ministry Pamphlet 154, 'Notes on the Prevention of Fatigue in Flying Personnel', October 1947 (first issued June 1943).
[124] Ibid. p. 4.

be used only in an 'occasional temporary emergency' in which the possible dangers from sleepiness were greater than those arising from performance decrement.[125]

On the other side of the Atlantic, the American Air Force advocated a similarly cautious approach to Benzedrine. American medical officers recognised that Benzedrine was 'no substitute for sleep' so recommended its use only in instances where rest was not possible. A 1944 article published in the *Science Newsletter* described the rationale of the American Benzedrine policy thus:

> The importance of the 'sleep crisis' may be appreciated if one remembers that military success depends not only upon the arrival of enough men and equipment at the right place at the right time, but also upon their continuation in action the right length of time. To win a battle, in other words, striking power must be supported by staying power … Ideally, staying power is obtained by replacement of tired men with rested reserves. This is not always possible and at such times it is better to give the men a 'Benzedrine alert' than to risk losing not only the battle but the men themselves.[126]

Echoing the sentiments of the Air Ministry, American military strategists argued that Benzedrine was only useful in circumstances where manpower shortages necessitated the continued use of tired fighters.

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[125] Francis, *The Flyer*; Rasmussen, *On Speed*, Pugh, 'The Royal Air Force, Bomber Command, and the use of Benzedrine Sulphate'; TNA AIR 2/14723: Air Ministry Pamphlet 154, p. 4.
[126] Anon, 'Army Uses Benzedrine Only When Necessary', *The Science Newsletter*, 46, 4 (1944) 55, p. 55.

In a pamphlet first published in June 1943, the Air Ministry recommended the use of sugar as a ready source of energy, and caffeine, which also worked to stave off sleepiness but did not give a 'false impression of well-being', like Benzedrine.[127] Flyers consumed caffeine in large quantities on both sides of the Atlantic. According to Derickson, the American military went through coffee at the 'extraordinary' annual rate of thirty-two pounds per person during the country's involvement in World War Two.[128] In another Air Ministry pamphlet, also published in June 1943, guidance was issued to aircrews on the bodily and mental signs of tiredness 'so that they maintain due accuracy and care when in a fatigued state, and thus avoid accidents'.[129] Based on the psychological research of Davis, the guidance was premised on the assumption that if crews were issued with 'special instructions' prior to flight they would be more likely to 'maintain a higher standard of accuracy and care, with a reduction of the number of flying accidents contributed to by fatigue.'[130] The squadron's Medical Officer, the pamphlet recommended, was best placed to provide flyers with details of what signs of deterioration to look out for including: decreased speed, overcorrection, and – as Winfield and Bartlett had established previously – the tendency to relax towards the end of flight.[131] The release of these pamphlets in 1943 demonstrates the RAF's cautious approach to Benzedrine and indicated to Medical Officers and crews that means other than pharmacology were central to the fight against fatigue.

[127] TNA AIR 2/14723: Air Ministry Pamphlet 154, p. 4.
[128] Derickson, '"No Such Thing as a Night's Sleep"', p. 8.
[129] TNA AIR 57/10: Air Ministry Pamphlet 153, 'Notes on the Prevention of Fatigue in Flying Personnel', June 1943, p. 1.
[130] TNA AIR 57/10: Dr D. Russell Davis, 'FPRC Report 509: Effect of Special Instructions on the Development of Signs of Mental Fatigue', December 1942, p. 1.
[131] TNA AIR 57/10: Air Ministry Pamphlet 153.

As Pugh has suggested, however, there was a tension between official Air Ministry guidelines on the use of Benzedrine and the practicalities of managing the substance at squadron level. Though an estimated seventy-two million amphetamine tablets were purchased for Britain's armed forces between 1942 and 1943, little is known about the rate of Benzedrine use in the RAF.[132] Francis and others have argued that 'little effort was made to regulate the supply' of Benzedrine, and that use for off-label reasons, including use to 'sustain the energies' of flyers during off-duty parties, was common but there is little convincing evidence of this.[133] Francis based his argument largely on the memoirs of WAAFs and other aircrew, but, given the lack of context, it is difficult to establish whether the experiences these record are representative of broader trends.

In some instances historians have drawn on oral history testimonies to provide evidence of use but, as Pugh has suggested, this can also be problematic.[134] In interviews Benzedrine is rarely referred to directly. Ambiguous language is often used, and former pilots rarely admit to taking amphetamines, perhaps because of the overtly negative discourse surrounding drug use today. One former flyer I interviewed, who served in the RAF in the post-war period claimed he knew people who took 'pills' and that from his experience it was 'quite common'.[135] Paul White's intentional use of ambiguous language here makes it difficult to establish what exactly he is referring to, whether to stimulants, hypnotics or something else altogether. Also, given that his knowledge was based largely on 'bar talk', as he referred

[132] Pugh, 'The Royal Air Force, Bomber Command and the use of Benzedrine Sulphate'.
[133] Francis, *The Flyer,* p. 121.
[134] Pugh, 'The Royal Air Force, Bomber Command and the use of Benzedrine Sulphate'.
[135] Interview with Paul White, 17 March 2016.

to it, Paul White's account may not be representative of common practice beyond his immediate group of friends and colleagues.[136]

Derickson has argued that amphetamine use may not have been as widespread as some historians believe. He has suggested that during the 1939-1945 war the ability to sustain wakefulness became a measure of manliness.[137] Building on this idea, Pugh has argued that, operating in the hyper-masculine squadron environment, a number of men chose not to utilise Benzedrine on operations. Drawing on oral history interviews carried out for the Imperial War Museum, Pugh has concluded that a number of men actively refused to take the drug to demonstrate their masculine mastery over fatigue and sleeplessness.[138] It would, therefore, be unwise to assume that Benzedrine was widely used, as Norman Ohler has stated in the German case of Pervitin.[139] Given the RAF's cautious approach to the drug throughout the war it seems more sensible, rather, to conclude that Benzedrine was one of many means of fighting fatigue.

Though histories of flying fatigue have focused extensively on the use of Benzedrine by British flyers during the Second World War, the evidence suggests that the RAF did not strongly advocate amphetamine use. Even after Benzedrine was formally cleared for use in an operational context in November 1942, the RAF continued to advocate other means of mitigating the effects of fatigue. Some of these methods drew on pre-war psychological models of fatigue, such as the distribution of special instructions, while others emphasised the importance of dietary supplements. As an article printed in

[136] Ibid.
[137] Derickson, '"No Such Thing as a Night's Sleep"'.
[138] Pugh, 'The Royal Air Force, Bomber Command and the use of Benzedrine Sulphate'.
[139] Ohler, *Blitzed.*

leading medical journal *The Lancet* in 1942 suggested, caffeine – in the form of coffee or 'strong sweet tea' – was often just as effective as amphetamines.[140] The RAF's approach to the management of flying fatigue was, then, more complex than some previous histories have indicated. Though Benzedrine was one means by which RAF flyers alleviated tiredness, other methods existed and were often advocated by the Air Ministry.

As the previous section demonstrates, the RAF framed fatigue in relation to performance throughout the Second World War. Though Pugh has argued that the RAF's approach to Benzedrine demonstrates a new preoccupation with wakefulness and the physiology of fatigue in this period, the methods of mitigating fatigue advocated by the Air Ministry during the war also suggest increasing concerns with performance decrement. Guidelines relating to the use of Benzedrine and 'special instructions' focused on mitigating the effects of deterioration, particularly towards the end of flight.[141] As the Air Ministry pamphlet published in 1943 made clear, wakefulness alone was not enough.[142] Precision and accuracy were also central to the avoidance of air accidents, and thus remained key concerns for the RAF.

Flying Fatigue After the War

Given its implications for the efficiency and safety of RAF pilots, military interest in flying fatigue persisted long after the cessation of the Second World War. Research carried out by the FPRC continued to examine fatigue in functional terms, but in the immediate post-war years, increasing attention

[140] Anon, 'Fatigue', *The Lancet*, 239, 6189 (1942) 450-451, p. 451.
[141] TNA AIR 57/10: Russell Davis, 'FPRC Report 509', p. 1.
[142] TNA AIR 2/14723: Air Ministry Pamphlet 154.

was paid to the relationship between fatigue and physiology. In line with contemporary research on the physiology of emotions taking place on both sides of the Atlantic, many post-war studies carried out by the FPRC sought to find physiological correlates for subjectively experienced fatigue states. An FPRC report produced by Reid in 1949 detailed a number of different physiological measures of fatigue, including 'finely balanced physiological functions' which might be expected to react sensitively to environmental stresses on the individual, yet which would be susceptible to reliable measurement, such as visual acuity, and 'cruder measures', such as loss in bodyweight.[143]

Other FPRC researchers privileged hormonal measures. Given the apparent importance of the adrenal cortex in stress and Addison's disease according to studies carried out by American researchers, FPRC investigators such as Margaret I. Stern, attempted to correlate the quantity of adrenal waste – ketosteroids – in urinary excretions with subjective fatigue states.[144] Stern found in a 1949 study of university students that, contrary to the conclusions of her American colleagues, levels of 17 and 20-ketosteroids did not increase following long flights.[145] In the same year another FPRC report, which outlined the work of W. S. Frederick, chief of the research branch of the KLM Royal Dutch Airlines Medical Department, concluded that no correlation existed between the concentration of 17-ketosteroids and subjectively reported

[143] TNA AIR 57/20: D. D. Reid, 'FPRC Report 721: Visual Tests of Fatigue in Operational Flying', reprinted from *British Journal of Social Medicine*, 3, 3 (1949) 101-109, p. 102; Ibid. p. 108.
[144] Hudson Hoagland, 'Adventures in Biological Engineering', *Science*, 100, 2587 (1944) 63-67.
[145] TNA AIR 57/20: Margaret I. Stern, 'FPRC Report 719: The Determination of Urinary Total Neutral 17 and 20 Ketosteroids in "Stress"', July 1949.

fatigue. In a lecture read before the International Air Transport Association (IATA) Technical Conference in May 1949, Frederick argued that no convincing correlation had been established between the production of 17-ketosteroids or, for that matter, any other measurable physiological function:

> To our astonishment the majority of these experiments never showed a deviation from normal values due to fatigue. In other words, during these experiments no appreciable changes were found in the functions of hearing, vision etc. While the subjects under test suffered a strong feeling of fatigue and wanted nothing but to rest, the functions of a great many organs and organic systems were completely unaffected by fatigue.[146]

The apparent failure of FPRC researchers to establish a meaningful relationship between physiology and subjective fatigue states did not deter later researchers from taking inspiration from physiological studies of stress.

In 1955 D. C. Fraser of the FPRC and RAF IAM proposed that fatigue should be considered a 'special form of stress condition'.[147] Drawing explicitly on earlier research on the physiology of stress – he referenced, in particular, his own publications on this topic – Fraser applied the 'theoretical framework' established in the field of stress research to the 'problem of fatigue'.[148] He reformulated a number of general principles that had become accepted in the field of stress research: that increasing stress beyond a certain level caused performance to deteriorate; and that the effect of stress was differential,

[146] TNA AIR 57/20: Dr W. S. Frederick, 'FPRC Report 723(a): Some Aspects of Fatigue', May 1949, p. 3.
[147] TNA DSIR 23/22938: D. C. Fraser, 'The Study of Fatigue', August 1954, p. 2.
[148] Ibid. p. 2.

affecting some people more than others. In this vein, he argued that fatigue should be considered as a 'deterioration in performance', which affected individuals according to their skill and experience as pilots.[149] Several other researchers also drew a link between fatigue and stress. In a 1958 article produced for the RAF IAM, K. F. Jackson proposed that fatigue should be considered as a temporary effect of stress.[150] More willing than Fraser to recognise the subjective experience of fatigue though, Jackson suggested the use of rating scales to take into account how pilots felt in addition to measuring urinary output of 17-ketosteroids.

A gradual shift away from physiological explanations and measures of fatigue in the post-war period was reflected in the countermeasures for fatigue proposed by FPRC researchers from 1949. Following the cessation of hostilities interest shifted away from the role of biochemical aids in the management of fatigue. Instead British research increasingly focused on the impact of factors such as sleep and nutrition. In a discussion of the Berlin airlift (26 June 1948-30 September 1949), during which crews commonly worked between twelve and sixteen hours a day, R. H. Stanbridge (1897-1986), a former Squadron Leader who had worked alongside members of the NIIP in the 1930s and later served as a medical officer for the Civil Aviation Authority (CAA), emphasised the importance of food in the alleviation of fatigue.[151] Hot meals, he argued, 'should be provided on the airfield and should be freshly cooked and well presented so that the original calorie value

[149] Ibid. p. 1.
[150] TNA AIR 2/14723: K. F. Jackson, 'Methods in the Study of Fatigue', November 1958, p. 1.
[151] Anon, 'Obituary: Air Vice Marshal R. H. Stanbridge', *British Medical Journal*, 292 (1986) 420.

is preserved and the meal is made attractive'.[152] Food was important, he argued, for nutritional purposes as well as for crew morale. Though the use of Benzedrine and other biochemical aids was increasingly side-lined by British military forces following the close of the Second World War, amphetamines retained a prominent position in the fatigue prevention policies of the American Air Forces. As Derickson has shown, Dexedrine – an amphetamine widely prescribed for attention deficit hyperactivity disorder and narcolepsy – was permitted for use by the American military up until the Vietnam War, when use was curtailed as the result of 'unpleasant revelations' about friendly-fire incidents and 'ugly associations' with addicted veterans.[153]

Civil Aviation in Post-War Britain

In the post-war period, civil aviation was dominated by former military personnel. Following national service, many RAF pilots retrained and were then employed by commercial carriers. Though the context was different, former RAF pilots retained their militaristic values and facilitated an informal cultural transfer of military discourse into a civil context. This had important implications for how fatigue was perceived and managed in post-war civil aviation. What follows here traces the enduring relationship between civil and military aviation in the second half of the twentieth century.

Civil aviation was a largely post-war phenomenon, but it was first established in the early-twentieth century. Though some had flown for pleasure since the late-nineteenth century, it was only after the First World

[152] R. H. Stanbridge, 'Fatigue in Aircrew: Observations in the Berlin Airlift', *The Lancet*, 258, 6671 (1951) 1-3, p. 2.
[153] Derickson, '"No Such Thing as a Night's Sleep"', p. 15.

War that a commercial air service was established.[154] The first regular international passenger air service was inaugurated on 25 August 1919 by Aircraft Transport and Travel (AT&T) between London and Paris. The journey took just over two and a half hours and cost £15 for a single passenger fare. A number of other small airlines followed AT&T, flying passengers to and from a selection of European destinations. Following the First World War there was an enormous surplus of cheap former military aircraft. Many of these were adapted for civil service, offering small airlines an inexpensive way to begin business.[155] Most of the newly founded airlines focused on carrying mail and express freight, such as newspapers and perishable goods, rather than carrying passengers.[156]

This was in part because the British public was largely disinterested in air travel at this time. As a means of transport, flying was expensive, uncomfortable, and flight times even for short trips were often lengthy as pilots depended on visual navigation, usually following railway lines.[157] As most planes had been converted from military use, they were not geared towards passenger comfort. The most commonly used type, the DH 4, a wood and fabric biplane, had a single Rolls Royce engine and cruised at around ninety miles per hour. It only had space to carry two passengers. There was no cabin pressurisation or soundproofing, so earplugs were necessary to withstand the noise of the engine. The heating and ventilation equipment were

[154] Bilsten, *Flight in America.*
[155] Peter Fearon, 'The Growth of Aviation in Britain', *Journal of Contemporary History*, 20, 1 (1985) 21-40.
[156] Peter Lyth, 'The Empire's Away: British Civil Aviation from 1919-1939', *Revue Belge de Philologie et D'Histoire,* 78, 3 (2000) 865-887.
[157] Terry Gwynn-Jones, *Farther and Faster: Aviation's Adventuring Years 1909-1939*, (London: Smithsonian Institution Press, 1991).

also inadequate, so passengers often experienced bouts of airsickness as a result of fuel inhalation.[158]

The Air Ministry did not control civil aviation in the way that it controlled the RAF, there was a general presumption that civil aviation was a matter for the private sector, but from the mid-1920s a number of civil airlines were granted subsidies by the government department.[159] In 1924 the Labour government established the first major British airline, Imperial Airways (IA). IA received a government subsidy of over £1 million over ten years and, in return, was expected to fly a minimum of 800,000 operational miles a year. In its early years IA focused on transporting passengers to European destinations. In 1928 IA offered what might now be called an inclusive package tour by air. Anxious that services be measured against the standards of deluxe rail and ocean travel, IA offered a luxurious package. Aimed at wealthy clientele – customers could expect to pay £435 each – it was a winter holiday comprising a thirty-five day tour of France, Spain, Morocco, Tunisia, Algeria, and Italy, and included meals and accommodation.[160] By the late-1920s civil aircraft were much improved technically and structurally. They had better engines, burnt higher octane fuels, and had all-metal bodies. They did not, however, meet the standards associated with luxury rail and ocean travel.[161] Failing to attract significant public interest, IA relinquished most of its European routes to other international operators and from the 1930s focused on the carriage of mail to and from the British Empire.[162] The focus on

[158] Lyth, 'The Empire's Away'.
[159] David Edgerton, *England and the Aeroplane: Militarism, Modernity and Machines*, (Basingstoke: Macmillan, 1991).
[160] Lyth, 'The Empire's Away'.
[161] Fearon, 'The Growth of Aviation in Britain'.
[162] Lyth, 'The Empire's Away'

passengers only re-emerged in 1938, when IA merged with a smaller government-subsidised operator, British Airways, to form the British Overseas Airways Corporation (BOAC). The onset of war in 1939, however, severely disrupted British air passenger services. Air travel only emerged as a viable commercial industry in the post-war period.

British civil aviation expanded significantly following the cessation of hostilities in 1945. A number of scholars have argued that civil aviation benefitted significantly from developments relating to technology and infrastructure that were hastened as a result of wartime necessity.[163] According to Peter Fearon, the 1939-1945 period saw considerable improvement in airport facilities, navigational aids, and engine power.[164] These developments meant that, post-war, civil aviation was better-established than it had ever been. In the early 1950s jet engine planes were first put into service. Able to cruise at altitudes of up to 40,000 feet, they offered a smoother and quieter flying experience. Jets could also travel at much faster speeds than propeller aircraft, reducing flight times to distant destinations by up to half.[165] As Lucy Budd, Morag Bell and Adam P. Warren have suggested, when BOAC introduced its first jet-powered aircraft – a de Havilland Comet – in 1952, flight times were immediately reduced. Flight times from London to Johannesburg fell from thirty-two to eighteen hours, Singapore could be reached in twenty-five hours rather than two days, and flight times to Tokyo were reduced from eighty-six to thirty-three hours. As

[163] For example, see: Fearon, 'The Growth of Aviation in Britain'; Thomas C. Lawton, 'Governing the Skies: Conditions for the Europeanisation of Airline Policy', *Journal of Public Policy*, 19, 1 (1999) 91-112; Gwynn-Jones, *Farther and Faster.*
[164] Fearon, 'The Growth of Aviation in Britain'.
[165] Jeremy R. Kinney, *Airplanes: The Life Story of a Technology*, (Baltimore: Johns Hopkins University Press, 2006).

BOAC's chairman, Miles Thomas, commented at the time, jet flight had 'shrunk the world to half its former size and … created a new vogue for international travel'.[166]

Until 1960 commercial airlines were controlled by the British government through the Ministry of Civil Aviation. On taking office in 1945, the Labour government had nationalised all British airfields and civil air operations. Existing national carrier BOAC was joined by two more airlines: British European Airways (BEA) for domestic European routes, and British South American Airways, which operated on Caribbean and South American routes. All three operators were state-owned, but were expected to operate on an ordinary profit and loss basis, with the Treasury taking the profits and bearing the deficits. In 1960 the Civil Aviation Licensing Act established a system of licensing for civil aviation in Britain that allowed privately owned airlines to enter the market for the first time since 1945. This change in policy led to a significant shift in civil aviation trends towards inclusive tour services. A number of new privately-owned airlines offered package holidays to Mediterranean resort areas. Inclusive tour traffic from Britain increased dramatically during the 1960s. In 1961 295,000 passengers travelled abroad on an inclusive tour. By 1971 2,698,000 passengers were choosing package holidays: a nine-fold increase.

[166] Lucy C. S. Budd, Morag Bell and Adam P. Warren, 'Taking Care in the Air: Jet Air Travel and Passenger Health, a Study of the British Overseas Airways Corporation (1940-1974)', *Social History of Medicine*, 25, 2 (2011) 446-461, p. 446.

National Service and the Civil Airlines

The growth of air tourism in the 1960s called for an increasing number of pilots to enter civil aviation. Although some of those entering the job market were drawn from civil flying schools, a large proportion of the pilots who were offered jobs came from a military background. According to A. N. J. Blain, who published widely on industrial relations in the transport sector in the middle decades of the twentieth century, around 70% of those employed in civil airlines in the 1960s and early 1970s had started their career and received their initial flight training in the armed forces.[167] This was in part due to the fact that initial training, if completed in a civil setting, was expensive to fund. Individuals could expect to pay up to £8,000 for an eighteen-month course at the College of Air Training in Hamble, although some cadets were able to obtain financial support in the form of Local Education Authority maintenance grants or airline sponsorship. As Gerard Hunt, who trained as a pilot in the early 1970s, described:

> In 1970 having left school with A Levels I went to the College of Air Training for an eighteen month … course on gaining a commercial pilot's licence which was sponsored by British Airways, we even got a grant from the local council as if you were going to university, so actually I was incredibly lucky and it was completely free for me to learn. So I came out of that in April 1972 with a commercial pilot's licence.[168]

[167] A. N. J. Blain, *Pilots and Management: Industrial Relations in the UK Airlines*, (London: George Allen and Unwin, 1972).
[168] Interview with Gerard Hunt, 8 February 2017.

Gerard Hunt was in the minority though, as many of those employed in the 1960s and early 1970s had military flying experience as a result of completing national service.

Between 1945 and 1963, when the British policy of national service officially ended, over two million men were conscripted into the British armed forces.[169] Young men between the ages of eighteen and twenty-six were conscripted for between eighteen months and two years.[170] Conscripts were able to state a preference for service and, as Roger Broad has shown, the RAF and the Royal Navy were popular choices. Indeed, by 1949 the RAF had the majority of 'regulars'.[171] Paul White, who was conscripted into the RAF in 1950, explained why he chose to fly:

> There was a choice then of going to the navy or to the RAF … Well, you're never really sure at that stage whether you're going to be able to do the job or not and if you can't you're liable to be sent to do some other horrid job because you're now part of an armed force. So rather than find that after a year I was now scrubbing decks or something in the navy I decided to go to the RAF.[172]

Some of the men conscripted between 1945 and 1963 were deployed to various theatres of war. The British colonial wars in Malaya, Kenya, and Cyprus all involved conscripts. For most men, though, national service mainly entailed extended training. Thousands of men attended RAF training bases at

[169] Richard Vinen, *National Service: A Generation in Uniform, 1945-1963*, (London: Penguin Random House, 2015).
[170] Roger Broad, *Conscription in Britain 1939-1964: The Militarisation of a Generation*, (London: Routledge, 2006).
[171] Ibid. p. 64.
[172] Interview with Paul White, 17 March 2016.

Padgate, Cardington, and West Kirby.[173] Following military service a number of men, including Paul White, sought employment in civil airlines. Paul White explained his reasoning for this as such:

> Well I thought I can fly airplanes, let's see if I can get into an airline. And after going and doing all sorts of new courses, because it's surprising how difficult it is to go from flying a military airplane to flying a commercial airplane, it's a very different prospect altogether, so there were a number of variations that I had to learn and various examinations I had to [take], and demonstrations of my ability before I could get a licence, an airline transport pilot's licence, and a chance to apply to airlines.[174]

After securing a commercial pilot's licence Paul White was offered a job with BOAC.

The movement of former military personnel to the commercial sector had profound implications for the culture and practices that permeated civil aviation in the second half of the twentieth century. Many of the former servicemen who were employed as commercial pilots observed and expected militaristic standards and practices: strict hierarchy, deference to authority, and efficiency. This militaristic rhetoric existed even at the most basic level of pilot image and language. Commercial pilots wore military-style uniforms and were allowed on 'leave' rather than holiday.[175] James Hall, a retired pilot who was employed by BOAC between 1966 and 1977, referred to this culture as a

[173] Vinen, *National Service.*
[174] Interview with Paul White, 17 March 2016.
[175] Modern Records Centre (hereafter referred to as MRC) MSS/248/4/2: BALPA, 'Flight Fatigue: Report of the Special Committee', second edition May 1972 with notes by Ninian Davies, p. 36.

'hangover from the Second World War'.[176] These sentiments were echoed by a number of former flight and cabin crew interviewed for this thesis. Former BOAC pilot Gerard Hunt described the practices in post-war civil aviation, particularly the heavy 'drinking culture', as 'a bit like the RAF'.[177] Charles Green, who worked as cabin crew for BOAC during the 1960s, recalled an instance when he was scolded by a former military flyer for failing to conversationally defer to his authority:

> At the beginning in '67 it was still very much hung up with the military and there was a lot of people [that] still … thought that they were in the forces and I can give you an example … I was a very junior new steward and I didn't call the captain 'sir' on the greeting of the day and I was hauled from the back of the airplane to the front of the airplane to welcome this captain. 'Good afternoon captain sir'. But what I'd actually said was 'good afternoon captain', I missed 'sir'.[178]

Though the context was different, former RAF pilots retained their militaristic values and facilitated an informal cultural transfer of military discourse and practices into a civil context.

Models of Civilian Flying Fatigue

In the post-war period then, particularly from the 1960s, former military pilots dominated civil aviation. Former service personnel also staffed many of the government departments and research committees associated with civil aviation. Notably, in the post-war period the FPRC became central to

[176] Interview with James Hall, 30 March 2016.
[177] Interview with Gerard Hunt, 8 February 2017.
[178] Interview with Charles Green, 21 November 2016.

research on fatigue as it affected pilots employed by civil airlines. In 1949 FPRC researchers partnered with BOAC, Britain's leading long-haul airline, in a study of skill fatigue.[179] This partnership marked the beginning of an enduring research relationship between military and civil circles on the subject of flying fatigue, in spite of the fact that several contemporary commentators questioned the similarities between military and civil aviation. Particularly during the final years of the Second World War, researchers and military personnel suggested that wartime flying subjected pilots to specific stresses and strains that did not effect civilian pilots.[180] It was held that, during conflict, pilot fatigue was largely the result of 'the prolonged exercise of courage'.[181] This source of fatigue was thought to be peculiar to military aircrew as wartime flying was 'never free from danger', so did not offer any opportunity for 'occasional complete relaxation' as was the case for other combatants and civilian pilots.[182] Many of the other causes of fatigue in military pilots were, Whittingham argued in an article published in the *British Medical Journal* in 1946, also thought to be present in civil aviation.[183] These environmental stresses included 'prolonged visual concentration', 'noise', 'cramped positions in some types of aircraft without opportunity to change', 'vibration', 'lack of

[179] TNA AIR 57/20: A. T. Welford, Ruth Brown, and J. E. Gabb, 'FPRC Report 725: Experiments on Fatigue as Affecting Skilled Performance in Civilian Aircrew', August 1949.
[180] Anon, 'Fatigue in Aircraft Pilots', *The Lancet*, 239, 6182 (1942) 234-235.
[181] WL PP/HEW/F.4/1 Letter to Sir Harold Whittingham from Air Commodore Consultant in Neuro-Psychiatry, 18 December 1942, p. 2; Lord Moran built on these sentiments in a book published in 1945, see: Lord Moran, *The Anatomy of Courage: The Classic WWI Account of the Psychological Effects of War*, second edition, (London: Robinson, 2007).
[182] WL PP/HEW/F.4/1 Letter to Sir Harold Whittingham from Air Commodore Consultant in Neuro-Psychiatry, 18 December 1942, p. 2.
[183] Harold Whittingham, 'Progress of Aviation Medicine in the Royal Air Force and its Application to the Problems of Civil Aviation', *British Medical Journal*, 2, 4462 (1946) 39-45.

sleep and lack of a hot meal'.[184] It was on these areas of convergence that the FPRC initially focused its research on flying fatigue in a civil setting.

Models of flying fatigue were often entangled with, and influenced by, broader economic and social concerns in the aviation industry. From the 1960s the Ministry of Labour commissioned much of the research carried out by the FPRC. The FPRC was asked on several occasions to investigate pilot workload and working conditions as part of a process of arbitration between pilots and airline managements. The Committee was involved in arbitration for BEA in 1960-1961, and again in 1963 and 1965-1966, and was involved in arbitration for BOAC in 1966. Led by Hugh Patrick Ruffell Smith (1911-1980), who had been employed in the RAF Medical Branch between 1938 and 1961, many of the workload studies carried out by the FPRC adopted the model of civilian flying fatigue suggested by Whittingham. A number of the reports and memoranda published by the FPRC between 1961 and 1966 framed fatigue as the result of environmental conditions.[185] Indeed, in a letter to Whittingham written in September 1961, Ruffell Smith listed the following five environmental stresses as the primary causes of pilot fatigue: excessive heat, very low relative humidity, glare, noise, and sleep deprivation. 'In my opinion', Ruffell Smith argued, 'the combination of stresses in this operation are likely to produce dangerous fatigue effects in the pilots undertaking them.'[186] For

[184] WL PP/HEW/F.4/1 Letter to Sir Harold Whittingham from Air Commodore Consultant in Neuro-Psychiatry, 18 December 1942, p. 3.
[185] WL PP/HEW/F.4/8: H. P. Ruffell Smith, 'An Investigation of Pilots' Working Conditions in a Civil Air Line', November 1961; WL PP/HEW/F.4/8: H. P. Ruffell Smith, 'Present Position of B.E.A. Pilots' Work Load Investigation: Memorandum to the FPRC Working Party on Aircrew Fatigue', January 1963
[186] WL PP/HEW/F.4/8: Letter from H. P. Ruffell Smith to Sir Harold Whittingham, 21 September 1961.

Ruffell Smith, then, fatigue was synonymous with dangerous performance decrement.

Importantly, though, Ruffell Smith diverged from Whittingham on the role of psychology and emotion in fatigue. A number of unpublished draft reports produced in association with the investigation of BEA pilot workloads in 1960-1961 indicate that, for Ruffell Smith, emotional stress was a major cause of fatigue in civil, as well as military, settings. One draft report, produced in November 1961, argued that the discordant relations between management and aircrew were a 'source of stress' for pilots. Ruffell Smith contended that his experience during the period of investigation gave the impression that relations between aircrew and management were 'unsatisfactory', and that this 'lack of harmony' might be an important cause of fatigue.[187] Another draft interim report of the same name, likely also produced in November 1961, expanded this discussion of stress and morale, arguing that:

> While there may be genuine cause for concern about some of the conditions of service, and the work-load on certain BEA schedules, our experiences and relationships during the period of investigation lead us to the conclusion that the root cause of the complaints and dissatisfaction goes much deeper. It lies in the ever-worsening relations between aircrew and management.[188]

According to this draft report, pilots expressed a 'lack of confidence in, lack of respect for, and rank mistrust' of BEA management, and felt that when

[187] WL PP/HEW/F.4/8: H. P. Ruffell Smith, 'Independent Investigation of Work-Load and Working Conditions of British European Airways' Pilots', November 1961, p. 13.
[188] Ibid. p. 8.

mistakes occurred there was 'one law for aircrew and another for management'.[189] The draft report recommended that 'strenuous efforts' be made to regain the good relationships and mutual confidence 'without which no airline can operate efficiently'.[190] It is unclear whether BEA management ever had sight of this draft report, but it is evident that Ruffell Smith removed all discussion of aircrew-management relations from the final version of the report. The increasingly carefully worded nature of criticism in the draft reports suggests that Ruffell Smith may have been under pressure from BEA management to present a favourable account of aircrew-management relations.

Partly, perhaps, as a result of pressure to underplay the psychological and emotional causes of fatigue, in later workload studies Ruffell Smith examined somatic expressions of subjective fatigue states. Using techniques comparable to those employed by Reid and Frederick shortly after the 1939-1945 war, and by contemporary stress researchers, Ruffell Smith attempted to measure fatigue by recording the heartbeat and the adrenaline levels of airline pilots in a 1966 workload study.[191] Ultimately, however, the 1966 report gave most weight to the subjective feelings of tiredness described by flight crew. Ruffell Smith explained the decision to privilege 'subjective' rather than 'objective' biological measures of fatigue as follows:

> The ambiguity of the word 'fatigue', when used in a scientific context is well recognised. In this report it is used to describe the subjective

[189] Ibid. p. 9.
[190] Ibid. p. 9.
[191] WL PP/HEW/F.4/8: FPRC Second Report on Flight Deck Work Loads in Civil Air Transport Aircraft by a team from the Board of Trade (Civil Aviation Department) and the Royal Air Force Institute of Aviation Medicine, Farnborough, December 1966.

> feelings of tiredness described by captains after a particular working period. Ideally we would have wished to use an objective measure of fatigue or performance decrement instead of a subjective one. Up to the time of writing no objective measure was available so that a subjective 'Fatigue Score' was used during these trials.[192]

In lieu of an 'objective' biological measure, Ruffell Smith suggested rating scales provided the 'best alternative', as the results were usually confirmed by the observers' assessment of a subject's fatigue state.[193]

The 1966 workload study utilised the Pearson and Byers Feeling Tone Checklist to obtain a score of the pilots' subjective impression of their energy levels.[194] The checklist, which was originally developed by the American Air Force to quantitatively measure aircrew fatigue, required pilots to rate themselves as 'better than', 'same as', or 'worse than' a number of statements that described different parts of a 'fatigue continuum'.[195] The statements ranged from words that implied energy and vigour – such as 'very lively', 'extremely peppy', and 'somewhat fresh' – to phrases that suggested different increments of fatigue – such as 'slightly pooped', 'petered out', and 'ready to drop'.[196] To make the checklist data quantifiable on a large scale, Ruffell Smith allocated points for each answer. Every response in the 'worse than' column received two points, while each answer in the 'same as' column received one point. Answers in the 'better than' column did not receive points.

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[192] Ibid. p. 4.
[193] Ibid. p. 43.
[194] Richard G. Pearson and George E. Byers, 'The Development and Validation of a Checklist for Measuring Subjective Fatigue', Air University, School of Aviation Medicine, USAF, Randolph AFB, Texas, December 1956, 1-16, available at <http://www.dtic.mil/dtic/tr/fulltext/u2/128756.pdf> [last accessed 15/04/15].
[195] Ibid. p. 1.
[196] Ibid. p. 16.

Pilots could score between zero and twenty points overall, with higher scores indicating greater feelings of tiredness. Ruffell Smith suggested that the quantification of subjective fatigue states using a points-based system removed the need to find a somatic expression of fatigue. Ultimately, he argued, pilots' self reports were reliable and provided the best available means of measuring and understanding fatigue.

Conclusion: The Wartime Hangover

The period between the outset of the Second World War and the growth of commercial airlines in the 1960s was crucial in establishing the rhetoric and practices relating to pilot fatigue that permeated British civil aviation throughout the middle and late twentieth century. Fatigue was first identified as an issue that might effect the health and performance of pilots by researchers shortly before the outset of the Second World War. This research, along with that published by the Air Ministry during and shortly after the 1939-1945 war established a complex picture of fatigue. While some investigators argued, in line with interwar research on flying stress, that flying fatigue was a primarily psychological phenomenon, others looked to working hours and physiology, citing loss of sleep and long flying hours as the primary causes of pilot fatigue. A functional model of fatigue, however, emerged. Framed in some instances in relation to wakefulness, and in others in terms of performance decrement, this model of fatigue was not entirely consistent, but the prevailing narrative was clear. As in the nineteenth and early twentieth-century science of work, fatigue was said to have implications for efficiency. Unlike in earlier factory-based studies though, fatigue was not framed in terms

of lost productivity. FPRC researchers instead framed fatigue in relation to manpower economy. Interest centred, then, less on output and more on the efficient use of resources. The avoidance of human error and accidents was central here.

The modes of management and regulation employed by military bodies and civil airlines during and shortly after the Second World War reflected this model of fatigue. Striking an often-precarious balance between the avoidance of breakdown and the maximisation of crews and machines, the RAF and, later, civil airlines, employed a range of measures for combatting fatigue. Reflecting the primary modes of management established by industrial fatigue research prior to the war, some, such as the use of pharmaceuticals and special instructions, focused on the individual, while others took a broader institutional approach.

While this and the previous chapter have focused largely on scientific and medical research, the following chapters take a different approach. Later chapters focus on policy and labour politics, rather than science and medicine. This focus on policy and practice should not suggest, though, that research on fatigue ceased in the post-war period. Quite to the contrary, scientific research on the effects of fatigue and sleep loss on pilot performance continued to be undertaken by the FPRC and the RAF IAM well into the 1970s. Much of this research continued to frame and investigate fatigue in broadly functional terms, as the precise mechanism of fatigue remained contested.

The following chapters trace the legacy of the developments described here. They show that, after the war the dual discourse of flying fatigue

established in wartime structured discussions of fatigue in civil contexts. In most instances, fatigue was considered in relation to performance decrement, while in some circumstances sleep and wakefulness took priority. The following chapters show, also, that the medically uncertain nature of fatigue had clear consequences for the regulation and the industrial negotiation of aircrew schedules in post-war Britain. Chapter Four demonstrates that aviation unions and associations made fatigue a priority at least in part because the nebulous nature of the condition allowed them to convincingly campaign for economic, social, health, and safety objectives simultaneously. It was in this context that the wakefulness model of fatigue was taken up most forcefully in the post-war period. A potent, and terrifying, manifestation of aircrew fatigue, sleepiness came to dominate trade union rhetoric in the 1970s. Though anxieties about aircrew unintentionally sleeping on the flight deck certainly proved a forceful motivation for the regulation of aircrew schedules, it was concerns about human error resulting from fatigue that first prompted regulatory review of aircrew schedules in post-war Britain, an issue that the next chapter takes up.

3

Flight Time Limitations and the Avoidance of Fatigue

On 13 March 1954, a British Overseas Airways Corporation (BOAC) Lockheed Constellation aircraft crashed at Kallang Airport, Singapore. Part way through a scheduled flight from Sydney to London the aircraft struck a seawall on approach to runway six at Kallang Airport. The undercarriage was damaged and the integral fuel tank was disrupted. When the aircraft touched down on the runway the starboard wing broke off and the undercarriage collapsed. The aircraft came to rest eighty yards from the seawall, in flames. A number of crew members, including Captain T. W. Hoyle, managed to escape the burning wreckage through a glass panel in the cockpit. The main cabin door and emergency exits were, however, immovable and though attempts were made to rescue passengers through holes cut into the fuselage these were, as one report commented following the accident, 'almost completely unsuccessful'.[1] Of the forty passengers and crew on board the aircraft, thirty-three were killed.

Following the accident, Singapore's Supreme Court conducted a public inquiry. On 16 November 1954, the inquiry commission published a forty-six page report, which detailed the causes and circumstances of the crash. The report drew attention to the 'undoubtedly long hours' worked by crew and the

[1] Anon, 'The Kallang Inquiry', *Flight International*, Nov 19 1954, 754, p. 754.

limited availability of in-flight rest facilities.[2] The crew, it was found, had worked for a total of twenty-one and a half hours and, while rest facilities were available, the inquiry commission deemed them inadequate. The Constellation aircraft was not equipped with bunks and crew were required to rest instead on a mattress 'placed over the luggage'. As the report noted, it seemed 'unlikely' that this provided 'a very comfortable resting place'.[3] The report concluded that insidious fatigue might have affected Captain Hoyle's judgement in the last stages of the approach. As the *Singapore Free Press* explained following the report's publication:

> The fact that his first point of touch down came closer to the threshold markings (at the seawall end of the runway) than he originally intended can probably be attributed to a degree of tiredness which he may or may not have been aware.[4]

Given the possibility that 'tiredness' might have affected Hoyle's performance and, in turn, caused the accident, the report published by Singapore's Supreme Court made two recommendations on the subject of crew fatigue: first, that crew fatigue be scientifically investigated; and, second, that the legislation which controlled pilots' hours of work and rest be reviewed.

Though an international industry, in the twentieth century civil aviation was governed almost entirely by national regulations.[5] As such it was not within the remit of Singapore's inquiry commission to produce directives in

[2] The National Archives (hereafter referred to as TNA) BT/248/110: Extract from the Kallang Accident Inquiry Report, 1954, p. 1.
[3] Ibid. p. 1.
[4] Anon, 'The Pilot, Not Ridge Gets Blame', *The Singapore Free Press*, Nov 16 1954, p. 1.
[5] Thomas C. Lawton, 'Governing the Skies: Conditions for the Europeanisation of Airline Policy', *Journal of Public Policy*, 19, 1 (1999) 91-112.

relation to the working practices of pilots and flight crew employed by British airlines. The recommendations outlined by the commission did, however, receive wide attention in Britain. Indeed, in the days immediately following the report's publication a number of British airline unions and associations publicly called for a review of pilots' hours of duty, in line with the recommendations of the Kallang inquiry. On 20 November 1954 Denis Follows, General Secretary of the British Airline Pilots Association (BALPA), penned an article for the *Times* in which he called for the introduction of a 'broad policy for maximum hours of duty for pilots … on a national scale':

> The public has a right to expect that, whatever else may be the hazards of air travel, at least those which can definitely be eliminated by straightforward ministerial regulation should not be allowed to persist. With the onrush of air transport in the short space of a generation, there is a gap in our social legislation which only by widespread public support can we hope to fill.[6]

It was important, Follows argued, that long hours of continuous duty – the apparent cause of the Kallang crash – were limited wherever possible.

At the time of the 1954 accident, there were no statutory regulations governing flight times in Britain. The regulations that did exist were not obligatory, and laid the responsibility for establishing flight time limitations on operators.[7] The 1954 Air Navigation Order required only that airlines produced flight time limitations in conformity with the permissive recommendations of the International Civil Aviation Organisation (ICAO),

[6] D. Follows, 'Duty Hours of Pilots: Recommendations to Minister', *Times*, Nov 20 1954, p. 7.
[7] TNA BT 248/110: Ministry of Civil Aviation minutes, 26 November 1954, p. 19.

which required that flight times of some sort 'should be established such as to ensure safety'.[8] Airlines variously interpreted this rule but, in most cases, imposed an upper limit on the number of hours pilots were permitted to fly in a month in line with the principle of the operational limit utilised by the Royal Air Force (RAF) during the Second World War.[9] Airlines rarely imposed limits on the number of hours a pilot could fly in a day or week, however, and given the excessive hours worked by the crew of the BOAC aircraft, the Ministry of Aviation felt it was important that the current system be re-examined. The Working Party on Operating Crew Fatigue and Flight Time Limitations (hereafter referred to as the Bowhill Working Party) was established to do just this. Demonstrating the close post-war relationship between civil and military aviation, the Working Party was led by Sir Frederick Bowhill (1880-1960), a senior military figure who had acted as Commander-in-Chief of Coastal Command and later Transport Command during the 1939-1945 war.

Following extensive consultation with airlines, trade unions, and the Air Ministry, the Bowhill Working Party made a number of recommendations for regulatory review in a report published on 15 December 1954. Breaking with the military model of a single monthly limit on flying hours, the Bowhill Working Party recommended quantitative limitations on daily and weekly hours of work. Based on the premise that fatigue was a short-term reaction to imbalanced working practices in a single day, the regulation of daily working hours was recommended above all else:

[8] TNA BT 248/110: Report of the Working Party on Operating Crew Fatigue and Flight Time Limitations, 15 December 1954.
[9] John Terraine, *The Right of the Line: The Role of the RAF in World War Two*, (Barnsley: Pen and Sword Military, 2010).

> Considering the detailed aspects of quantitative limitations the most likely source of fatigue is the individual flight rather than the amount of flying done during a month, a quarter or a year. This is due to the fact that the pattern of public transport operations is long consecutive hours of duty followed by very generous rest periods. The Working Party, therefore, consider that any policy of quantitative limitations should pay particular attention to the individual flight.[10]

The nature of civil flying in 1950s Britain – long hours of work followed by long hours of rest – caused, according to the Bowhill Working Party, acute rather than 'cumulative' fatigue.[11] As such, the committee's final report recommended that a limit on the number of hours pilots could work in a single day was the single most important countermeasure for fatigue. The report recommended a daily maximum of sixteen hours, but suggested that this could be extended to twenty-four consecutive hours 'to provide operators with reasonable flexibility in respect of slipping and rostering'.[12] The report also recommended limits on weekly, monthly, and yearly flying hours. It suggested a maximum of fifty flying hours per week, 125 flying hours per month, and 1,000 flying hours per year. The recommendations of the Bowhill Working Party formed the basis of a new Air Navigation Order, which came into effect on 1 May 1957.

Like previous regulations, the new Air Navigation Order was permissive and allowed airline managements scope to apply limits as they saw fit. While carriers were encouraged to adopt the daily, weekly, monthly, and yearly

[10] TNA BT/248/110: Report of the Working Party on Operating Crew Fatigue and Flight Time Limitations, 15 Dec 1954, p. 7.
[11] Ibid. p. 7.
[12] TNA BT/248/110: Working Party on Operating Crew Fatigue: Meetings 2 and 3 September 1954, p. 8.

limits recommended by the Bowhill Working Party, this was not mandatory or enforceable. The regulations introduced by the Ministry of Transport in the 1950s set the tone for all subsequent regulation of aircrew schedules for the following twenty years. As in the 1957 Air Navigation Order, later regulations tended to be permissive – to allow airlines discretion in terms of their implementation – and to conceptualise fatigue as a short-term, rather than cumulative, problem.

This approach to flight time regulation was first challenged in the 1970s when, in response to growing concerns about the relationship between pilot workload, stress, and flight safety, the recently formed Civil Aviation Authority (CAA) introduced new regulations that intended to balance the work and rest of pilots both within and between rosters. This established a regulatory framework that remains largely unchanged to the present day.

This chapter disentangles the relationship between fatigue, working hours, rest, and regulation in post-war Britain. With a specific focus on the flight time limitations introduced by regulatory agencies in 1957 and 1975, it examines how and why fatigue was managed in civil aviation in the second half of the twentieth century. It is structured in two parts. The first examines the rationale for the regulatory changes discussed here. It engages, in particular, with Alan Derickson's argument about the regulation of workers' hours on the other side of the Atlantic. Fatigue and sleepiness were, according to Derickson, only a concern for regulators in twentieth-century America in instances where publics were endangered.[13] Legislation that

[13] Alan Derickson, *Dangerously Sleepy: Overworked Americans and the Cult of Manly Wakefulness*, (Philadelphia: University of Pennsylvania Press, 2014).

strictly controlled hours of work and rest was only introduced for occupations where fatigued workers posed a threat to publics. The rationale for such regulation was clear: protection of the public. The first part of this chapter examines the rationale for the regulation of pilots' hours of work and rest in post-war Britain. With a specific focus on the documents produced by the Bowhill Working Party and the Bader Committee I argue that while public safety was emphasised in both regulatory reviews other – mostly administrative, but also economic – issues were important.

Situating flight time limitations in a broader history of health and safety regulation, in the second part of this chapter I argue that, though formally in place to protect publics, the regulations that governed aircrew schedules in post-war Britain were permissive and premised on voluntarism rather than a strict system of command and control. Operators were able, as in the interwar years, to schedule intensive and imbalanced rosters with little oversight from regulatory agencies and, as such, fatigue remained endemic in commercial aviation throughout the twentieth century.

Dangerous Fatigue: Regulatory Rationale in Post-War Britain

Aircrew schedules were first subject to regulation in the post-war period, but efforts to mitigate the effects of fatigue in industry began long before this. Of course, for much of the nineteenth and early twentieth centuries working times were under-regulated. Indeed, a number of occupations in Britain encouraged workers to stay on the job beyond their contracted hours. The increasing popularity of scientific management and, specifically, Frederick Winslow Taylor's (1865-1915) piece rate system in America, and from the 1910s

Britain, engendered a culture where overwork was normalised.[14] The rise of piece work and bonus systems, which explicitly connected output and remuneration, redefined what constituted a fair day's work. With the rewards of labour closely tied to output, workers from all sectors of industry and service were encouraged to increase their effort to enhance their employability and earning potential. The intensification of work caused by incentive-based systems often exacerbated problems of fatigue and overstrain. As Arthur McIvor and others have shown, though some industrialists restricted the working hours of their employees from the nineteenth century, the British state was loath to introduce any regulations that might fetter industry, including limitations on hours of work.[15]

In some instances, though, working hours were formally restricted. In Britain regulations intending to minimise worker fatigue stretch back to the nineteenth century. Many of these state regulations – including the 1844 and 1850 Factory Acts – had a social and moral imperative. They were intended to protect vulnerable groups from exploitation.[16] Gary Cross has argued that in Britain and elsewhere, shorter hours campaigns were bound up with both the burgeoning phenomenon of leisure and Victorian social concerns about self-improvement. Indeed, many advocates of limited working explicitly framed their campaigns as part of broader projects aimed at inculcating the working population with middle-class values through rational recreation and purposeful

[14] Daniel Nelson, 'Taylorism and the Workers at Bethlehem Steel, 1898-1901', *The Pennsylvania Magazine of History and Biography*, 101, 4 (1977) 487-505; Daniel Nelson, 'Scientific Management, Systematic Management, and Labor, 1880-1915', *The Business History Review*, 48, 4 (1974) 479-500.
[15] Arthur J. McIvor, *A History of Work in Britain, 1880-1950*, (Basingstoke: Palgrave, 2001).
[16] Vicky Long, *The Rise and Fall of the Healthy Factory: The Politics of Industrial Health in Britain, 1914-60*, (Basingstoke: Palgrave Macmillan, 2011).

leisure. The argument held, as Cross has shown, that time away from work was crucial for personal, and also communal, development. Time off allowed workers the opportunity to consume culture, to further their education, to become, essentially, better people.[17] Some advocates of shorter hours framed their arguments in line with the those of the International Labour Organisation and, later, the Universal Declaration of Human Rights, which held that rest, leisure, and reasonable limitations on working hours were fundamental human rights.[18] Humans, no matter their race, class, or religion had a right to time. It was a matter of social justice.

In other instances, though, activists argued that allocated time for rest had implications within the workplace. Content and well-rested workers were, according to this line of argument, more productive. This argument had its roots in the nineteenth century. In the 1890s a number of socially minded industrialists argued that productivity was closely related to the health and wellbeing of workers.[19] In the early twentieth century, though, productivity became the dominant discourse surrounding and justification for limitations on hours of work in Britain.[20] In the early and middle decades of the century research committees including the Health of Munitions Workers Committee (HMWC), the Industrial Fatigue Research Board (IFRB), and the National Institute of Industrial Psychology (NIIP) demonstrated experimentally that a relationship existed between hours of work and rate of output. A major

[17] Gary Cross, *The Quest for Time: The Reduction of Work in Britain and France, 1840-1940*, (Berkeley: University of California Press, 1989).
[18] Sangheon Lee, Deirdre McCann and Jon C. Messenger, *Working Time Around the World: Trends in Working Hours, Laws and Policies in Global Comparative Perspective*, (Abingdon: Routledge, 2007).
[19] A. J. McIvor, 'Employers, the Government, and Industrial Fatigue in Britain, 1890-1918', *British Journal of Industrial Medicine*, 44, 11 (1987) 724-732.
[20] Long, *The Rise and Fall of the Healthy Factory.*

contention of these committees was that human energy was a finite resource. Very long hours of work were, these committees thus argued, a false economy. Long hours of work depleted energy reserves, which explained why the productivity of workers fell towards the end of long shifts.[21] When workers were allowed to take brief rest breaks, however, output increased. One IFRB study, carried out in 1924, found that fifteen-minute rest pauses resulted in a 'slight but real improvement of output' of 5-10%, even when diminution of working time was taken into account.[22] Rest pauses of this type were widely popular with workers. As the *British Medical Journal* reported in 1925:

> The writers of the present report draw attention to the fact that the operatives were unanimous in their appreciation of the rests, and often volunteered such remarks as 'The work is not so depressing', and 'I feel less tired at the end of the work'.[23]

Limitations on working hours and the introduction of rest periods thus made both good economic and humanitarian sense.

As a result of these investigations hours of work and rest were increasingly regulated in interwar Britain. The recommendations of the IFRB and NIIP were incorporated into the 1937 Factory Act, which made limitations on working hours and provisions for rest mandatory for women and young people.[24] Weekly working hours were capped at forty-eight, daily hours at eleven, and limits were placed on when work could start and end. Though

[21] A. J. McIvor, 'Manual Work, Technology, and Industrial Health, 1918-39', *Medical History*, 31, 2 (1987) 160-189.
[22] Anon, 'Rest Pauses in Industry', *British Medical Journal*, 1, 3298 (1924) 482-483, p. 483.
[23] Anon, 'Restpauses in Industrial Repetition Work', *British Medical Journal*, 2, 3386 (1925) 964, p. 964.
[24] Long, *The Rise and Fall of the Healthy Factory.*

detailed and expansive the 1937 Factory Act was permissive. There were numerous exemption clauses so, while ambitious, implementation of the Act was patchy and its impact limited. Indeed, during the Second World War intensive working practices, similar to those common in the First World War, returned to some areas of industry. As McIvor has demonstrated, following the Dunkirk evacuation in 1940 workers involved in war industries commonly worked up to seventy-five hours a week; twenty-seven hours more than the 1937 Factory Act prescribed.[25]

Although much useful historical literature has explored the regulation of work and rest in factory settings, fatigue was also experienced and managed beyond the factory floor.[26] In nineteenth and twentieth-century Britain fatigue was widespread beyond the factory. It was endemic in a number of industries and professions, particularly those that required round-the-clock work such as transportation, construction, agriculture, healthcare, and other public services. The regulation of working hours in these industries was, however, inconsistent. For some, such as railway workers, hours of work were controlled from the late nineteenth century.[27] For many others, though, industry-specific regulation of work and rest was absent. This trend was not specific to Britain. On the other side of the Atlantic, working hours were only regulated beyond the factory in certain circumstances. It is the central premise of Derickson's *Dangerously Sleepy* that regulation was limited to industries

[25] McIvor, 'Manual Work, Technology, and Industrial Health, 1918-39'.
[26] McIvor, 'Employers, the Government, and Industrial Fatigue in Britain, 1890-1918'; McIvor, 'Manual Work, Technology, and Industrial Health, 1918-39'; Long, *The Rise and Fall of the Healthy Factory;* Anson Rabinbach, *The Human Motor: Energy, Fatigue, and the Origins of Modernity*, (Los Angeles: University of California Press, 1992); Anna Katharina Schaffner, *Exhaustion: A History*, (New York: Columbia University Press, 2016); and ongoing doctoral work by Steffan Blayney.
[27] Bridget M. Hutter, *Regulation and Risk: Occupational Health and Safety on the Railways*, (Oxford: Oxford University Press, 2001).

where ‘sleeplessness posed a threat to general welfare’.[28] In other words, regulatory agencies only limited hours of work in instances where publics were potentially endangered by worker fatigue. In twentieth-century America federal legislation was introduced to control the work and rest of train operators, long-haul truckers, and commercial pilots. In some instances, further legislation was enacted at a state level. For example, in the 1980s New York state introduced restrictions on the number of hours postgraduate medical trainees could work.[29] According to Derickson, in these instances the primary rationale for regulation was the protection of publics.

Regulatory Review from Bowhill to Bader

While Derickson’s argument holds for Britain to some extent, in civil aviation concerns about profitability and administration sat alongside questions of danger in creating regulatory frameworks. Legislation governing health and safety in Britain emerged in a piecemeal fashion. Christopher Sirrs has shown that regulators responded to particular problems as they arose. Industrial disasters aroused public and political attention, and were, as such, often followed by regulatory review and the reactive extension of legislation. In the twentieth century, a number of regulations were updated following large-scale industrial accidents. In 1959 the Factory Act was reviewed following a deadly mill fire in Keighley, Yorkshire, while in 1969 the Mines and Quarries (Tips)

[28] Derickson, *Dangerously Sleepy,* p. 27.
[29] Ibid.

Act advanced new requirements for spoil tips following the 1966 Aberfan disaster.[30]

In the twentieth century, the regulatory agencies responsible for flight safety adopted a similarly reactionary approach to regulation. Air accidents acted as flashpoints for regulatory review throughout the twentieth century. In the post-war period a number of air accidents demonstrated the scale of human hurt that worker fatigue made possible. The crash at Kallang Airport on 13 March 1954 killed thirty-three people, the largest death toll of any accident to date in Singapore. It was widely reported in the British media.[31] An article published in the *Times* shortly after the accident, described the crash vividly:

> Spectators say that as the aircraft came to land it tilted sharply to the right as the wheels touched the runway, then ran on for 100 yards before it slewed off the runway, turned completely round, broke in two, and exploded. The right wing was torn off and the other buckled; one of the four engines was hurled a distance of 100 yards. Smoke and flames shot high into the air, and almost immediately a second explosion occurred. Attempts were made to release the trapped passengers by attacking the fuselage with axes. Several injured passengers were taken from the wreckage in this way, but all died before reaching hospital.[32]

[30] Christopher Sirrs, 'Accidents and Apathy: The Construction of the "Robens Philosophy" of Occupational Safety and Health Regulation in Britain, 1961-1974', *Social History of Medicine*, 29, 1 (2016) 66-88.
[31] See for example, Anon, 'MPs to Hear of Plane Tragedy', *Daily Mirror*, Mar 15 1954, p. 1; Anon, 'The Air-Crash Girl Dies and Her Fiancé Weeps', *Daily Express*, Mar 15 1954, p. 1.
[32] Anon, 'Airliner Death Roll 33', *Times*, Mar 15, 1954, p. 6.

This detailed and linguistically emotive description was provided in the *Times* in lieu of a photograph, but other newspapers published harrowing images of the 'burning wreck'.[33] On 16 November 1954, the *Daily Mirror* carried a front-page photograph of a harrowing scene: air stewardess Josephine Butler being dragged from the burning BOAC Constellation aircraft by fire fighters. The accompanying article provided an overview of the Singapore Supreme Court's report. Though aircrew fatigue was just one area covered by the report, it featured heavily in the article. Indeed, the subtitle made the apparent importance of fatigue clear: 'Pilot Was Tired'.[34] Reports of this kind caused widespread public dismay and justified trade union calls for regulatory change. It was in this context that the Bowhill Working Party was formed in 1954.

Led by Group Captain Douglas Bader (1910-1982), the Committee on Flight Time Limitations (hereafter referred to as the Bader Committee) was established in response to similar concerns. It was widely argued by contemporary commentators that 1972 was a bad year for the aviation industry: over 1,700 passengers and crew died in air crashes in the space of twelve months.[35] The most widely reported accident, the Staines air disaster, killed 118 people. It was, by far, the worst ever air accident in British history. The Air Accidents Investigation Branch (AAIB) concluded following a public inquiry that the incident occurred as a result of poor crew coordination and

[33] Anon, 'Verdict on Amazing Air Crash', *Daily Mirror*, Nov 16 1954, p. 1.
[34] Ibid. p. 1.
[35] A. N. J. Blain, *Pilots and Management: Industrial Relations in the UK Airlines*, (London: George Allen and Unwin, 1972).

pilot error caused by an 'abnormal heart condition'.[36] As in 1954, though, the British media focused on other issues. Much was made, for example, of the conditions of work commonly experienced by British European Airways (BEA) pilots prior to the accident and Captain Stanley Key's complaints about intensive working. In November 1972, the *Times* published an article detailing Key's complaints, prior to his death, about the length of his 'working days and lack of free weekends'.[37] While the Staines air disaster was never explicitly attributed to fatigue, the wide publicity afforded to Key's complaints following the crash pointed to a relationship between working conditions, pilot morale, and pilot health that the newly created CAA was keen to address. The Bader Committee was established in response to these concerns.

Both the Bowhill Working Party and the Bader Committee were established to improve the safety of public transport aircraft. Indeed, the formal remit of the Bader Committee was, as stated by CAA Chairman Lord John Boyd-Carpenter (1908-1998):

> To inquire into the adequacy of present measures taken to prevent such fatigue in flight crews of public transport aircraft as is likely to endanger the safety of the aircraft and to make recommendations.[38]

The Bader Committee was, thus, concerned 'solely with fatigue, and the measures taken to prevent fatigue, in relation to <u>safety</u>'.[39] The onus here was

[36] Air Accidents Investigation Branch, *Trident I G-ARPI: Report of the Public Inquiry into the causes and circumstances of the accident near Staines on 18 June 1972*, (London: HMSO, 1973), p. 54.
[37] Anon, 'Pilot gave warning of crash risk in using inexperienced crews "two hours before Trident take-off"', *Times*, Nov 29 1972.
[38] TNA DR/13/4: Douglas Bader, 'Report of the Committee on Flight Time Limitations', June 1973, p. 1.
[39] Ibid. p. 2.

on the safety of the travelling public, rather than the health and wellbeing of those involved in the operation of aircraft. According to Bridget Hutter, the same rationale underlay the regulation of railways workers' hours in the nineteenth and twentieth centuries.[40] While compensation dominated discussion of railroad regulation, regulatory reviews of flying fatigue were most concerned with the location of responsibility for air safety.

In meetings on 2 and 3 September 1954 the Bowhill Working Party explicitly discussed where the responsibility for fatigue management lay. The committee agreed that, ultimately, flight crew should be held accountable:

> There appears to be a tendency to take away certain responsibilities from the captain of the aircraft and replace this by legislation. Surely this is a wrong attitude. The captain of the aircraft must be responsible for the safety of his aircraft and in this safety factor fatigue must always be predominantly in his mind. The question has been mooted by the unions that the captain may be influenced by fear of his owners or by financial reasons, or being paid more by continuing flying. Of course this can happen, human nature being what it is, but we cannot legislate for every human factor, and our examinations have shown that this position very rarely, if ever, arises.[41]

In the view of the Bowhill Working Party, ultimate responsibility for flight safety lay with the pilot, who should, if necessary, be able to self-manage fatigue in-flight. The committee softened this stance, however, following further consultations with aviation unions. The final report of the Bowhill Working Party called for operators to take responsibility for the avoidance of fatigue in

[40] Hutter, *Regulation and Risk.*
[41] TNA BT/248/110: Working Party on Operating Crew Fatigue: Meetings 2 and 3 September 1954, p. 2.

flight crew. Operators, it proposed, should set quantitative limitations on flying times. While the Bowhill Working Party did not think operators should be left with too 'much discretion on a subject in which the effect on airline costs may come into conflict with safety requirements', the committee concluded that only operators were in a position to 'assess satisfactorily the nature and effects of the work falling on … operating crews'.[42] Operators, then, were held responsible for fatigue management by virtue of their specialist knowledge.

Twenty years later the Bader Committee adopted a similar approach to flight safety. For the Bader Committee, the avoidance of fatigue relied on co-operation between airlines and employees. Airlines, the Committee proposed, must provide adequate conditions and facilities for rest, while flight crew were to 'make optimum use of the opportunities and facilities' for sleep and rest at work and home and to 'plan rest periods properly'.[43] Fatigue often resulted, the Bader Committee argued, from misuse of rest periods. 'It would appear to us', the Committee's report noted, 'that some crew members fail to make the best use of their rest periods'.[44] The implication here was that flight and cabin crew deliberately misused periods allocated for recuperation and sleep for various leisure and social activities. At the time of the Bader Committee's regulatory review this view was widespread. In December 1972, retired pilot Anthony Cavendish wrote, in a letter to the *Times* that:

> The captains, if they do not have local friendships, or do not wish to dine with one of their stewardesses, drink, read or browse … Let me

[42] TNA BT/248/110: Report of the Working Party on Operating Crew Fatigue, p. 6; TNA BT/248/110: Working Party on Operating Crew Fatigue: Meetings 2 and 3 September 1954, p. 7.
[43] TNA DR/13/4, Bader, 'Report of the Committee on Flight Time Limitations', p. 24.
[44] Ibid. p. 24.

> choose my words carefully. Stewardesses regularly use their rest periods to have a good time when they lay-over. They often have boy friends in their ports of call, and make up their sleep on flights.[45]

A number of the former cabin and flight crew interviewed for this thesis spoke of a culture not dissimilar to that described by Cavendish. As one retired cabin attendant put it: 'you get a seven-four-seven to take you from one party to another and I slept when I could'.[46]

Unlike fatigue committees in the first half of the twentieth century, neither the Bowhill Working Party nor the Bader Committee were involved in the collection of laboratory or observational data. No investigations were commissioned or undertaken by the committees either in laboratories or operational aircraft. Instead, like the wartime surveys of fatigue undertaken by Charles Symonds (1890-1978) and Denis J. Williams in 1942, fatigue and its management were reframed in terms of subjective opinion. In both cases committee members were merely involved in the review of existing data and the collection of opinion from different parties. Aeromedical evidence was side-lined by both committees. While the Bowhill Working Party consulted a number of medical officials from military and civil circles – including Director of Medical Services to BOAC Sir Harold Whittingham (1887-1983) – the committee disregarded medical evidence on the basis that no 'practical test' could be applied to operating crews, 'other than intelligent observation of the individual, to decide when performance had deteriorated to a dangerous

[45] Anthony Cavendish, 'Pilots' Hours of Work and Rest', *Times*, Dec 15 1972, p. 15.
[46] Interview with Matthew Hart, 26 January 2017.

extent'.[47] In 1972 the Bader Committee made a similar argument for the exclusion of aeromedical evidence from its regulatory review:

> At present it appears that no satisfactory psychological or physiological tests have been devised which will provide positive evidence of the presence of fatigue. Tests of performance, similarly cannot yet be correlated with established standards of fatigue. Consequently we have concluded that the assessment of fatigue can only be undertaken subjectively at this time.[48]

Both committees relied, instead, on subjective accounts of fatigue proffered by trade unions and airlines. As a result, the committees relied on a model of fatigue grounded in anecdote and molded by financial and lifestyle concerns. Medical evidence did not inform regulations.

In the 1970s this entailed the exclusion of evidence relating to circadian 'desynchronization'.[49] Though a well-established physiological side effect of transmeridian air travel by the 1960s, the Bader Committee did not consider, or seek to relieve by way of regulation, circadian disruption in aircrew. Tacitly recognised for centuries, the cyclical functions of the body were increasingly investigated in the twentieth century. Extensive animal studies and, later, experiments on humans in laboratories and workplaces confirmed early assumptions about biological periodicity.[50] Human and animal life, it was

[47] TNA BT/248/110: Report of the Working Party on Operating Crew Fatigue, p. 4; during the 1939-1945 war Whittingham served as Director General of Medical Services in the RAF, he also had a long association with the FPRC. He was Chief Executive Officer 1939-1941 and Chairman 1949-1967.
[48] TNA DR/13/4: Bader, 'Report of the Committee on Flight Time Limitations', p. 3.
[49] Jürgen Aschoff, 'Circadian Rhythms in Man', *Science*, 148, 3676 (1965) 1427-1432, p. 1432.
[50] P. J. Taylor, 'Shift and Day Work: A Comparison of Sickness Absence, Lateness, and other Absence Behaviour at an Oil Refinery from 1962 to 1965', *British Journal of Industrial Medicine*, 24, 2 (1967) 93-102; R. T. W. L. Conroy, Ann L. Elliot, and J. N. Mills, 'Circadian

found, biologically oscillated over hours, days, and weeks. Though no consensus existed in relation to the precise mechanisms involved in mediating biological rhythms until later in the twentieth century, by the early 1970s it was widely agreed that hormones excreted by the pineal gland played a role in synchronising biological rhythms.[51] Though widely covered in industrial medical journals from the 1960s, discussion of circadian disruption in the airline industry only began in earnest in the mid-1970s, after the Bader Committee had completed its regulatory review.

The Bader Committee based its recommendations, instead, on a model of work and rest it deemed similar to the normal working week in other occupations. The Committee suggested that quantitative limitations on pilots' hours of work and rest should be based on a new concept: the 'duty cycle'.[52] As the Bader Committee set out in its rationale for recommendations: 'This concept [the duty cycle] is akin to the normal manner of covering a like situation in other occupations and professions in industry and business.'[53] The shift-based system of scheduling common to civil aviation should be replaced, the Bader Committee argued, with one that replicated the model found in office-based occupations as closely as possible. Drawing on contemporary discussions about work-life balance and male emotional health, the Bader Committee suggested that proper attention be paid to the overall planning of the duty cycle – including working hours, rest periods, and time off – and

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Rhythms in Plasma Concentration of 11-Hydroxycorticosteroids in Men Working on Night Shift and in Permanent Night Workers', *British Journal of Industrial Medicine*, 27, 2 (1970) 170-4.

[51] Ross A. McFarland, 'Air Travel Across Time Zones', *American Scientist*, 63, 1 (1975) 23-30.

[52] TNA DR/13/4: Bader, 'Report of the Committee on Flight Time Limitations', p. 15.

[53] Ibid. p. 15.

between consecutive duty cycles.[54] This, the Committee argued, was the 'most appropriate framework for … preventing fatigue'.[55] Marking a break with previous regulatory trends, the Bader Committee argued that balance across the whole duty cycle was a better antidote to crew fatigue than limitations on single duty periods.

The Bader Committee then proposed a more complex regulatory framework than existed in other occupational contexts, but limitations on working hours remained important. The Bader Committee suggested limits on daily, monthly, and yearly hours of work: fourteen hours a day, 100 hours a month, and 900 hours a year. Single duty periods were then to be subject to a number of conditions. Flights that required any form of work that might impinge on the normal hours of sleep were subject to stricter limitation. For example, the maximum permissible length of a flying duty period that commenced between ten o'clock and night and six o'clock in the morning was eleven, rather than fourteen hours. The Committee recommended that the following table 'should be mandatory' for flights scheduled out of a pilot's home base.[56]

[54] Michael Young and Peter Wilmott, *The Symmetrical Family* (London: Penguin, 1973); Frederick Cooper, 'Medical Feminism, Working Mothers, and the Limits of Home: Finding a Balance Between Self-Care and Other-Care in Cross-Cultural Debates About Health and Lifestyle, 1952-1956', *Palgrave Communications*, 2 (2016) 1-11, available at: http://www.palgrave-journals.com/articles/palcomms201642 [last accessed 14 July 2016].
[55] TNA DR/13/4, Bader, 'Report of the Committee on Flight Time Limitations', p. 15.
[56] Ibid. p. 8.

	Maximum length of flying duty period/number of sectors							
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8 +**
0801-1300	14	13.25	12.5	11.75	11	10.25	9.5	9
1301-1800	13	12.25	11.5	10.75	10	9.25	9	9
1801-2200	12	11.25	10.5	9.75	9	9	9	9
2201-0600	11	10.25	9.5	9	9	9	9	9
0601-0800	12.5	11.75	11	9.5	9.5	9	9	9

Flying Duty Period Commencing at 'Base'
Report of the Committee on Flight Time Limitations', Table 8.7, p. 18

This basic framework, which limited duty periods according to time and location, remained in place for the rest of the century.

Though the Bader Committee and the Bowhill Working Party had been created to investigate and provide recommendations on fatigue and scheduling solely in relation to flight safety, both committees considered the regulation of flight and rest periods from additional perspectives. Over the course of eight meetings the Bowhill Working Party listened to the views of both airlines and trade unions. Operators argued that no more regulations were necessary or required, while unions made the case for specific statutory limits. The Bowhill Working Party recognised that neither operators nor trade unions considered the regulation of flight times 'from an entirely fatigue point of view'. As Bowhill noted after meeting with both parties in September 1954:

> The questions of operations, schedules, etc. loom very largely into the picture, and in this respect the operators have a dual capacity, one for

> the good of their aircrew and one for their good name, while the unions are out to improve the conditions of the aircrew.[57]

Fatigue could not, as Bowhill's notes make clear, be considered within a vacuum as it related directly to issues of scheduling, working hours, and rest time. In other words, the safety, social, and economic aspects of operating crew fatigue were inextricably linked. The apparent tension between economic and safety considerations formed an important part of the Bowhill Working Party's final report. In the 1954 report the committee argued:

> Any consideration of flight time limitations requires careful attention to be paid to the economic consequences. Every addition to the minimum operating crew of an aircraft means less pay load. Every additional stop to enable crew to rest may mean adding to an operator's crew strength or slowing down a schedule. Bearing in mind the highly competitive nature of international air transport it will be necessary when determining limitations which ensure adequate safety standards to ensure that an operator's ability to compete successfully is not necessarily impaired.[58]

Though safety was paramount, for the Bowhill Working Party it was important that operators were not financially 'impaired' by strict legislation.[59]

Economic considerations also loomed large for the Bader Committee, which noted in 1972 that 'limitations on flight and duty periods have a marked influence on the economy of airline operations'.[60] For the Bader Committee

[57] TNA BT/248/110: Working Party on Operating Crew Fatigue: Meetings 2 and 3 September 1954, p. 1.
[58] TNA BT/248/110: Report of the Working Party on Operating Crew Fatigue, 7-8.
[59] Ibid. p. 8.
[60] TNA DR/13/4: Bader, 'Report of the Committee on Flight Time Limitations', p. 2.

though, administrative ease was a more important motive for regulatory review. The Bader Committee's final report published in June 1973 recommended that existing legislation should be simplified. The report argued that the current system of regulation – an 'interconnected mass of rules, law, directions and guidance' – was fragmented and confusing, even for those who administered and enforced it.[61]

By 1972 British civil aviation was subject to a number of national and international obligations. As a signatory to the 1944 Chicago Convention on International Civil Aviation, Britain had an obligation to comply with the international standards and recommended practices in the various annexes to the Convention.[62] The Bader Committee identified one annex that was particularly relevant to fatigue and flight time limitations – Annex Six, Part One 'The Operations of Aircraft', which stated that:

> An operator shall formulate rules limiting the flight time and flight duty periods of flight crew members. These rules shall also make provision for adequate rest periods and shall be such as to ensure that fatigue, occurring either in a flight or successive flights or … over a period of time due to these and other tasks, does not endanger the safety of the flight.[63]

The guidance contained within Annex Six of the Chicago Convention was general in nature and did not provide any numerical values for rest or duty periods.

[61] Ibid. p. 8.
[62] Ibid.
[63] Ibid. p. 7.

A number of national requirements did lay down explicit limitations on flight time, but these rarely matched up. There was, for example, a disparity between the limits proposed by the 1972 Air Navigation Order and the guidance material contained in the 1966 Air Operators' Certificate.

Crew	Air Navigation Order Limit	Air Operators' Certificate Limit
1 pilot	10	10
2 pilots	15	12
2 pilots and 1 flight navigator	15	13
2+ pilots	15	15
2+ pilots with sufficient bunks for inflight rest	22	18

The Basic Limiting in Flying Duty Periods for Scheduling Purposes
Report of the Committee on Flight Time Limitations, Table 4.3, p. 8

Operators variously interpreted the guidelines, and often set different internal limits on flying hours than those laid down by law as a result of industrial agreements with trade unions. There was significant variation between airlines. Some airlines, such as BOAC, scheduled pilots right up to the legal limits, while others, such as BEA, imposed much more restrictive limits. A number of airlines set different limits depending on the model of aircraft. The Bader Committee summarised their findings in the following table.

Operator	Annual Flying Hours	28 Day Summer Flying Hours (Winter)	Flying Duty Period Limits
British Caledonian	700	85 (80)	10.5-14
VC10 and B707	500	70 (60)	10.5-13
BAC 1-11			*dependent on crew
Dan-Air			
BAC 1-11	550	75 (60)	12
Comet 4	650	85 (70)	12
BOAC	1000	Non-comparable 'credited' hours system subject to 100hr/28 day legal limit	9.5-12
BEA Trident Fleet	600	75	12
BEA Airtours	600	80 (60)	12

Industrial Limits
Report of the Committee on Flight Time Limitations, Table 5.1, p. 10

Existing measures for the prevention of aircrew fatigue were, the Bader Committee concluded, complicated and disjointed. The Committee advocated, instead, a more rational and flexible system of control, 'preferably in one document', that simplified and clarified the limitations.[64] Following the publication of the Bader Committee's final report in 1973 administrative concerns came to dominate discussion of subsequent legislation.

Cabin Crew, Fatigue, and the Civil Aviation Authority

The Bowhill Working Party and the Bader Committee examined fatigue solely as it pertained to flight deck crew: pilots, navigators, and flight engineers.

[64] Ibid. p. 9.

Tasked with the investigation of fatigue exclusively as it affected flight safety, both committees formally excluded cabin attendants from the remit of study. Framed, as in America, as 'carefree hostesses and waitresses', cabin crew were not thought to have a bearing on the safety of passengers.[65] As such, in the post-war period the working practices of cabin crew were subject to far less investigation and control than their counterparts in the cockpit.

In the earliest years of commercial aviation, the special knowledge and skills of cabin attendants were emphasised. Indeed, prior to World War Two only trained only nurses were hired as cabin attendants in Britain. As Suzanne Kolm and Kathleen Barry have argued of American airlines, though, in the post-war period the work of cabin crew was rebranded to emphasise the service of passengers.[66] The health and safety aspects of the job were downplayed, and airlines instead emphasised the social and emotional skills of crew members. The medical care of passengers remained important, however. Even when the need for a nursing qualification was removed in the post-war period, cabin crew were trained to recognise and respond to symptoms of disease in flight.[67]

Cabin crew were also held to have an important role in emergencies. They were primarily responsible for the evacuation of passengers. As one former pilot described, 'if you've got a very effective well-trained cabin crew

[65] Derickson, *Dangerously Sleepy*, p. 40.
[66] Suzanne L. Kolm, 'Who Says It's a Man's World? Women's Work and Travel in the First Decades of Flight' in Dominick A. Pisano (ed.), *The Airplane in American Culture* (Michigan: University of Michigan Press, 2003), pp. 147–64; Kathleen M. Barry, *Femininity in Flight: A History of Flight Attendants*, (London: Duke University Press, 2007).
[67] Lucy C. S. Budd, Morag Bell and Adam P. Warren, 'Taking Care in the Air: Jet Air Travel and Passenger Health, a Study of the British Overseas Airways Corporation (1940-1974)', *Social History of Medicine*, 25, 2 (2011) 446-461.

they will save a lot of people's lives'. 'Oh I've got very strong views about that', said retired pilot James Hall in interview:

> I get very irritated with the sort of image some airlines project as cabin crew being dolly birds that go around to smile sweetly at you and serve you coffee or drinks or whatever … I mean the fact of the matter is, the cabin crew legally are there to get … the passengers out on the assumption that the flight crew are incapacitated, and if you've got a good cabin crew it'll make a lot of difference in … those sort of situations.[68]

The importance of cabin crew for the evacuation of passengers was highlighted in the aftermath of the crash at Singapore's Kallang Airport in 1954. As previously described, passengers were not evacuated through emergency exits following the crash and, as a result, perished in the burning wreckage. Though the Bowhill Working Party made no reference to cabin crew in their recommendations for regulatory review, in 1957 the Air Navigation Order was amended to require the carriage of at least one cabin attendant on public transport flights with twenty or more passengers for the 'purpose of performing in the interests of the safety of passengers duties to be assigned by the operator or the person in command of the aircraft'.[69] This amendment formalised the role of cabin crew as, first and foremost, one of safety management. Indeed, this is how most of the former cabin attendants interviewed for this thesis described their role. As retired cabin attendant Julia

[68] Interview with James Hall, 30 March 2016.
[69] 1957 Air Navigation Order cited in TNA BT 248/511: CAA Committee on Flight Time Limitations Working Paper, 'Background Notes: Cabin Attendants', 5 September 1973, p. 1.

Evans explained, the 'primary function of cabin crew members on the aircraft is for safety'.[70]

Though the work of cabin crew was bound up with safety from at least the mid-1950s, cabin attendants' hours of work and rest were not subject to regulatory control until ten years later. In 1967 the Air Navigation Order was amended to require that airlines limited the flying duty periods of cabin crew and established minimum rest periods. No numerical limits were contained within the Air Navigation Order, but guidelines were contained within Civil Aviation Publication (CAP) 295:

> 5.1 Because of the nature of their duties it is reasonable that cabin staff can undertake somewhat longer flying duty periods than the flight crews with which they are associated, but the scheduled maximum should not normally exceed fourteen hours.
> 5.2 If adequate rest facilities – a passenger-type seat for example – are provided, this period may be extended by an amount equal to the time for which a cabin crew member is relieved of all duties, within an overall scheduled maximum of twenty hours.
> 5.3 For off-schedule operations the maximum flying duty period for cabin staff should not exceed twenty-two hours. Where fourteen hours flying duty is exceeded during off-schedule operations, rest facilities should be provided, including a suitable seat on the aircraft.[71]

The guidelines introduced to minimise the fatigue of cabin attendants were more flexible and permissive than those covering flight crew. Rest facilities were, for example, deemed 'adequate' for cabin crew if a 'passenger-type

[70] Interview with Julia Evans, 28 November 2016.
[71] Board of Trade, *CAP 295: Flight Time Limitations and Avoidance of Excessive Fatigue in Aircrews*, (London: HMSO, 1967), p. 10.

seat' was available.[72] Flight crew, however, were entitled to bunk rest under the same conditions.

When the Bader Committee began a review of flight time limitations in 1972, cabin crew were deliberately excluded from the field of inquiry. Throughout the Bader Committee's period of investigation though, the Transport and General Workers' Union (TGWU) – the major union representing cabin crew in Britain – campaigned for their inclusion. In March 1973, a few months prior to the publication of the Bader Report, the TGWU submitted a report to the CAA detailing the 'plight of cabin crew' and made the case for more restrictive flight time limitations for cabin as well as flight deck staff. [73] Under CAP 295, the report argued, cabin crew were permitted to work 'Dickensian' hours.[74] Citing a survey completed by Hugh Patrick Ruffell Smith (1911-1980) and others in 1973, the TGWU contended that cabin crew experienced significant sleep loss, particularly on transmeridian routes, that was not adequately alleviated by in-flight rest periods or post-flight time off.[75]

The Bader Committee, however, took no heed of these complaints. While regrettable, the fatigue of cabin crew was, the Committee argued, not a safety concern. Walter Tye, the Committee's chief medical adviser, outlined this reasoning in a letter to BOAC's medical officer shortly after the publication of the Bader Report:

> I have always felt that on pure safety grounds duty periods for cabin crews were extremely difficult to determine … Cabin crews' principal

[72] Ibid. p. 10.
[73] TNA BT 248/511: Paper submitted to CAA by the TGWU in March 1973, p. 1.
[74] Ibid. p. 3.
[75] See: TNA BT 248/511: F. S. Preston, H. P. Ruffell Smith, V. M. Sutton-Mattocks, 'Sleep Loss in Cabin Crew', *Clinical Aviation and Aerospace Medicine*, 44, 8 (1973) 931-935.

> contribution to safety is their ability to assist in the evacuation after a crash, and I imagine that a pretty exhausted crew would still recover sufficiently to do this job. Thus the safety/fatigue/duty period argument for cabin crews is even more tenuous than it is for flight crews.[76]

Undeterred by the exclusion of cabin crew from the Bader Committee's regulatory review, the TGWU continued to campaign for more restrictive limitations on cabin crews' hours of work and rest on safety grounds.

Following the publication of the Bader Report further communications took place between the TGWU and the CAA and in September 1973, Lord Boyd-Carpenter asked the Bader Committee to meet with representatives from the TGWU. On 10 September 1973, a meeting was held between members of the Bader Committee and John Cousins, the National Secretary of the TGWU. Cousins argued in the meeting that the exclusion of cabin staff from the remit of the Bader Committee's investigation was a 'glaring omission'. [77] He contended, as in the report submitted to the CAA in March, that the guidelines introduced under CAP 295 'had not proved satisfactory in controlling excessive working hours among cabin crew'.[78] According to Cousins some 'unscrupulous airlines' routinely exceeded the maximum limits suggested in CAP 295.[79] As a result, Cousins and his colleagues argued, fatigue was endemic among cabin crew. This was, he argued, a problem as cabin crew 'had a safety function to fulfil in respect of evacuation, and if they got fatigued this could be a hazard'.[80] While sympathetic to the concerns of

[76] TNA BT 248/511: Letter from W. Tye to Dr G. Bennett, 31 August 1973, p. 1.
[77] TNA BT 248/511: Notes of Committee on Flight Time Limitations Meeting held on Monday 10 September 1973 in Room 816 Aviation House, p. 2.
[78] Ibid. p. 2.
[79] Ibid. p. 2.
[80] Ibid. p. 2.

the TGWU, the Bader Committee explained that it would be 'difficult' to regulate the hours of cabin crew on 'public safety grounds', but accepted that there may be 'staff safety and health considerations'.[81]

The meeting was informal, but ended with an agreement between the TGWU and the Bader Committee to submit a request to the CAA for further study of cabin crew fatigue prior to the implementation of a new system of flight time limitations. No such investigation was ever carried out, but in 1974 the CAA agreed to introduce 'revised provisions' for cabin staff to coincide with the introduction of the new system of flight time limitations in 1975.[82] The rationale for this did not relate to safety, economic, or any other issue discussed in relation to flight deck crew. The justification was, instead, entirely administrative.

The introduction of revised regulations of cabin crew schedules was intended to extend the regulatory reach of the newly-formed CAA. Established in 1972 under the terms of the 1971 Civil Aviation Act, the CAA took on responsibilities that had previously been spread across three separate regulatory bodies.[83] Keen to mark the CAA out as an industry-wide regulator distinct from other government agencies, Lord Boyd-Carpenter saw the inclusion of cabin crew under the purview of flight time limitations as a means of limiting the reach of the Department of Employment and the agencies born of the 1974 Health and Safety at Work Act (HSWA): the Health and Safety

[81] Ibid. p. 2.
[82] TNA BT 248/511: Letter to unknown recipient from J. A. Chadwell, 20 June 1974.
[83] Civil Aviation Act 1971, available at: http://www.legislation.gov.uk/ukpga/1971/75/contents/enacted [last accessed 17 August 2016].

Executive and the Health and Safety Commission. Lord Boyd-Carpenter articulated this rationale in an internal CAA memorandum:

> The important point is that if anybody is to start laying down maximum hours for aircraft cabin crews that person should be us (if I may be guilty of an Irishism!) Otherwise we may get into considerable difficulties … So far as I am concerned, I never contemplated our assuming a general responsibility for cabin crew welfare any more than we have assumed it for pilots. But there is an uncertain zone in which the effect of hours of work (both in respect of number of hours worked and of time changes) do have significance both from the safety angle (which is solely our business) and from the 'health and welfare angle' … we shall have to get round to this fairly soon as it is important that the ground should not be wholly occupied by the Department of Employment.[84]

Keen to avoid the inclusion of cabin crew under the purview of broader health and safety legislation, Lord Boyd-Carpenter decided to regulate cabin crews' hours of work and rest alongside flight crews' in one broad system of control.[85]

A new system of flight time limitations, which included limitations for flight deck and cabin crews, was introduced in 1975. Some changes were made to the Air Navigation Order, but most of the new regulations were contained within the accompanying guidance document CAP 371, which held the title: 'The Avoidance of Excessive Fatigue in Aircrews: Requirements

[84] TNA BT 248/511: Internal CAA Memo to Mr Vivian from Lord Boyd-Carpenter, 21 May 1974, p. 1.
[85] TNA BT 248/511: Letter from Miss G. M. E. White to Dr Tye, 29 August 1973, p. 1.

Document'.[86] Under CAP 371, cabin crews' hours of work and rest were subject to stricter control than in the past. The regulations were, however, less nuanced and more flexible than those affecting flight crew. The maximum flying duty period for cabin crew was longer than that permitted for flight crew by one hour, and the conditions affecting the length of flying duty periods were less complex. While rules about duty length differed hour to hour for pilots, the hours of work of cabin crew were grouped together, and though calculated similarly to pilots – by the length of the immediately preceding duty period – the minimum rest periods for cabin crew were shorter by one hour than those for flight crew. The flexibility of regulations pertaining to cabin crew, in comparison with flight crew, continued to be justified on the grounds that cabin crew had a lesser role in flight safety. In a meeting with the TGWU in July 1975, the formal line from the CAA remained that it was 'justifiable to treat cabin crew less restrictively than flight crew' because the 'primary safety role of cabin crew' only came into play after an accident 'and the degree of arousal engendered in these circumstances is enough to overcome some degree of fatigue'.[87]

Throughout the post-war period, then, while flight safety remained the formal justification for flight time limitations, other concerns frequently entered into regulatory debate. The rationale for British regulatory practice was more complex than the model outlined by Derickson.[88] In Britain flight safety was one of many concerns. Other issues consistently influenced regulatory bodies

[86] Civil Aviation Authority, *CAP 371: The Avoidance of Excessive Fatigue in Aircrews: Requirements Document*, (London: Civil Aviation Authority, 1975).
[87] TNA BT 248/511: Meeting between CAA Chairman and TGWU 10 July 1975: notes on matters which may be raised by TGWU, p. 1.
[88] Derickson, *Dangerously Sleepy.*

including, as this chapter has demonstrated, economic and administrative concerns. The relationship between the CAA and other regulatory bodies was particularly important here. What follows moves on from regulatory review. The next section examines the implementation of regulations, specifically CAP 371, in the broader context of British health and safety reform in the 1970s.

Civil Aviation, Aircrew Fatigue, and the British Regulatory State

The 1970s marked a new, and increasingly complex, regulatory phase in Britain. While new right ideologies – which advocated deregulation, denationalisation, and a move away from redistributive welfare policies – were gaining momentum politically, in the same decade the most detailed statutory health and safety regulations to date were introduced under the 1974 HSWA.[89] The HSWA, though, represented a paradox. While the Act extended health and safety coverage to more workers than ever before it was, like nineteenth and early twentieth century legislation, premised on the ideal of self-regulation by industry. It enacted the recommendations of the Safety and Health at Work Committee. Chaired by Lord Alfred Robens (1910-1999), previously of the National Coal Board, the Committee argued that voluntary self-reform should lie at the core of legislative initiatives.[90] This was, the Committee argued, particularly important for health and safety regulation,

[89] Neil Rollings, 'Cracks in the Post-War Keynesian Settlement? The Role of Organised Business in Britain in the Rise of Neoliberalism Before Margaret Thatcher', *Twentieth Century British History*, 24, 4 (2013) 637-659; Ben Jackson, 'The Think-Tank Archipelago: Thatcherism and Neo-Liberalism' in Ben Jackson and Robert Saunders (eds.), *Making Thatcher's Britain*, (Cambridge: Cambridge University Press, 2012), pp. 43-61.
[90] Matthias Beck and Charles Woolfson, 'The Regulation of Health and Safety in Britain: From Old Labour to New Labour', *Industrial Relations Journal*, 31, 1 (2000) 35-49.

which was, if expansive and detailed, made rapidly obsolete by new technologies and processes. As Vicky Long has described, the HSWA discarded the detailed regulations which had characterised the 1937 Factory Act in favour of generalised rules.[91] The HSWA was, like the 1901 Factory Act, flexible and permissive.[92] Premised on the assumption that overly detailed statutory regulation promoted 'apathy', the HSWA placed responsibility for health and safety beyond the state, with 'those who create[d] the risks and those who work[ed] with them'.[93]

While the Safety and Health at Work Committee recommended that subsequent health and safety legislation provide universal protections for all workers, the HSWA did not apply to a number of industries. Healthcare, teaching, and transport were all excluded from coverage, except where transport workers were stationed at static bases. Indeed, the Committee had explicitly excluded transport workers – including train operators, lorry drivers, and pilots – from the remit of the study as transport safety was deemed to be too 'large' and 'difficult' an area to legislate on:

> Provisions for the safety and health of those engaged in flying aircraft, driving trains, lorries and so on … [could not be] considered in isolation from a whole complex of special considerations such as the constraints imposed by the design of transport vehicles; the circumstances in which they operate which include many eventualities beyond the control of the employer; and the predominant need – in terms of numbers at risk – to safeguard the travelling public and the public

[91] Long, *The Rise and Fall of the Healthy Factory.*
[92] Sirrs, 'Accidents and Apathy'.
[93] Lord Robens, *Safety and Health at Work: Report of the Committee 1970–72*, vol. 1, Cmnd. 5034, p. 1; Ibid. p. 7.

> generally. We accept these matters must be dealt with within transport legislation.[94]

For this reason, even after 1974 the transport sector continued to be governed by industry-specific regulations. That is not to say that the transport industry was unaffected by the publication of the Committee's report. Indeed, the report acted as a 'catalyst' for change in a number of sectors, including the rail industry.[95] Likewise, civil aviation, while not directly under the purview of the HSWA, was influenced by the Act's deregulatory agenda. The CAA, like the Safety and Health at Work Committee, trusted that regulation based on market mechanisms would be effective. After all, the argument went, it was in the interests of both airlines and crew members to ensure flight safety. It was on this basis that the CAA introduced flight time limitations in 1975. A co-operative model of regulation, similar to the HSWA, CAP 371 and the accompanying Air Navigation Order were reliant on voluntarism.

The flight time limitations introduced by the CAA in 1975 were more detailed and comprehensive than any previous regulations. The amended Air Navigation Order and accompanying circular made allowances for a number of different circumstances but, crucially, limitations were premised on a model of fatigue that took little account of the major causes and effects of exhaustion identified by crew members. Following the publication of the Bader Report aviation weekly, *Flight International*, noted that the proposed regulations made little effort to allay the 'time-zone effect'. Circadian disturbance was to

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[94] Ibid. p. xiv; Ibid. p. 56.
[95] Hutter, *Regulation and Risk,* p. 37; Hutter has described the effects of the Robens Report and the HSWA on the regulation of occupational health and safety on the railways, see: Ibid. pp. 40-47.

be mitigated by restrictions on flying duty periods; specifically by reductions of one hour for early morning departures and instances where crews were not adjusted to local time. For *Flight International*, however, this did not represent a 'real attempt' to deal with the effects of circadian disruption:

> The committee has therefore failed to grapple with one main area of complaint, and seems to think we [flight crew] can be relied on to keep London time in Tokyo (GMT plus 9hr) and in Anchorage (GMT minus 10hr) on the same trip.[96]

The 1975 limitations also made no attempt to control the travel of crew to and from work, a major concern of trade unions. A number of the former flight and cabin crew interviewed for this thesis explained the rationale for this concern: tiredness made the drive to and from work dangerous.

Most airlines recommended that crew members live less than half an hour from base, but a number of the former flight and cabin crew interviewed for this thesis resided much further away than this. They lived, often, in remote village locations in Devon, Dorset, and Cambridgeshire, locations they chose, at least in part, for respite from the noise of cities and airports. Sleep during time off was an important consideration here. For these crew members, the drive to work could be several hours long. Some identified this travel as a cause of tiredness, but in most instances interviewees framed commute-related difficulties as an effect, rather than cause, of work-induced fatigue. As one former pilot, James Hall, put it:

[96] Anon, 'Time Enough to Rest? Pilot's Point of View on the "Bader Report"', *Flight International*, Jul 5 1973, 7-9, pp. 7-8.

> That's probably when I felt the most fatigue of all is driving back from a flight … and I can remember on some occasions really struggling to keep awake as I was driving home and almost nodding off … You know you'd come back after an overnight flight to London and by the time you'd gone through customs and all the rest of it, signed off in crew reporting and got to your car, by that stage your body was just [about ready to] collapse and go to sleep … I would probably single out as the greatest impact that fatigue had on me was a safe drive home after a night flight.[97]

The lethargy experienced by workers following flight was framed as a major occupational hazard by many of the former flight deck and cabin crew interviewed for this thesis. A number of respondents, like James Hall, found that lethargy prompted instances of sleepiness. One former pilot, Paul White, described one such occasion, during a one-hour drive home from Heathrow: 'I actually did notice this on one occasion, you can actually fall asleep driving home'.[98]

The regulations introduced in 1975 made no attempt to deal with this problem and crew members were, thus, required to self-manage fatigue in these instances. Many engaged in the practices described by former flight attendant Jeffrey Cooper: they drove with the windows down, listened to loud music, 'screm[ed] and shout[ed], and drove 'fast'.[99] In some instances though, when fatigue was particularly severe, crew members incorporated rest stops into the drive home. Former cabin attendant Julia Evans, described one such instance:

[97] Interview with James Hall, 30 March 2016.
[98] Interview with Paul White, 17 March 2016.
[99] Interview with Jeffrey Cooper, 24 January 2017.

> I was driving down the motorway and the traffic was terrible just before the Winchester bypass started, and I was so tired and I had the window down and I had the radio on and I knew … how tired I felt and I thought I'll just pull over and have half an hour's sleep until the traffic goes so I drove north of Winchester … I'll just you know nip in here somewhere I'll lock myself in the car and I'll put the seat back and I'll just go to sleep for a little while. Which I duly did, and I was woken up nine hours later by a policeman knocking on the window, and I'd lost that completely … I just lost all that time. That's how tired I must have been. My neck was all hanging. You know, you're just so tired.[100]

Like the workplace regulations premised on the HSWA, the system of flight time limitations introduced in 1975 was more expansive and detailed than any prior regulatory framework governing aircrew schedules in Britain. But, as these testimonies make clear, CAP 371 and the accompanying Air Navigation Order did not entirely eradicate fatigue. This was in part because, as outlined above, the regulations did not attempt to control a number of the issues that workers identified as problematic. Broader changes to the aviation industry were also important though. The 1970s and 1980s saw increasing economic deregulation and marketisation of civil aviation in Britain. Competition between airlines intensified in this period. Pilot utilisation and scheduling were key concerns and, as the following sections show, increasing competition prompted a number of airlines to exploit the permissive nature of flight time limitations for commercial gain.

[100] Interview with Julia Evans, 28 November 2016.

Reasonable Freedom: CAP 371 and Associated Variations

Following the publication of the Bader Committee's report in June 1973, the CAA published a circular, CAP 371, to accompany the amended Air Navigation Order.[101] The 1975 publication closely followed the recommendations of the Bader Committee. The maximum permissible flying duty hours were lifted straight from the report: fourteen hours a day, 100 hours a month, and 900 hours a year. Also on the recommendation of the Bader Committee's report, the CAA appointed an advisory Flight Time Limitations Board (FTLB), initially led by Bader, to advise the CAA on issues of flight safety, flight time limitations and associated legislation, and to act as a reference body to advise the Flight Operations Inspectorate on any contentious application of the requirements.[102]

The main function of the FTLB was to approve or disprove requests for variations. The Bader Committee recommended that 'arbitrary' figures, like those stated previously, be used as a general scheduling guide, but that operators could submit a scheme with slight variations to the FTLB for consideration if compensatory factors meant that the overall scheme 'achieved an equivalent level of safety' to CAP 371.[103] Paragraph 13.2 of the Bader Committee's report, the seed from which the concept of variations grew, explained the justification for this:

> We consider it important that any written requirement for Flight Time Limitations should have as uniform an effect as possible in achieving

[101] Civil Aviation Authority, *CAP 371: The Avoidance of Excessive Fatigue in Aircrews: Requirements Document*, (London: Civil Aviation Authority, 1975).
[102] TNA DR/13/4: Bader, 'Report of the Committee on Flight Time Limitations'.
[103] TNA DR/13/1: Flight Time Limitations Board, Minutes of Meeting, 1 July 1975, p. 5; TNA DR/13/1: Flight Time Limitations Board, Minutes of Meeting, 13 November 1975, p. 1.

> the objective of fatigue prevention. It is clear that the several factors which determine the periods of work and rest vary considerably with the nature of the operation. The written requirements, therefore, must either be detailed and elaborate, or in basic form with reasonable freedom to apply them with commonsense.

The Bader Committee recommended that the latter would offer a 'practicable solution for the future'. The 'freedom' to apply requirements did, however, leave CAP 371 potentially open to manipulation by unscrupulous operators.[104] In August 1973, shortly after the publication of the report, the Bader Committee discussed this potential problem. The Committee suspected that, particularly in the early stages of the new requirements, 'there could be very large numbers of requests made for variations', and that any 'widespread use of variations could debase the general level of protection' intended in CAP 371.[105]

The Bader Committee's initial misgivings proved correct. In the years following the implementation of the new regulatory system virtually all sections of CAP 371 were varied by one company or another. Variations were granted for a number of issues including the length of flying duty periods, the length of rest periods, and the maximum number of hours a crew could work in seven consecutive days. This allowed for significant differences between airlines. While Monarch pilots could expect a flying duty period of twelve hours and fifteen minutes, a British Caledonian pilot with 'exactly the same aircraft and route' could expect a more restricted flying duty period of eleven hours and

[104] TNA DR/13/4: Bader, 'Report of the Committee on Flight Time Limitations', p. 32.
[105] TNA DR/13/4: Bader Committee, 'Flight Time Limitations Board', 29 August 1973, p. 3.

forty-five minutes.[106] Laker pilots were granted eighteen hours rest following a period of twelve hours on standby and five hours flying. Under the same conditions Dan Air pilots were only permitted to rest for twelve hours. Britannia pilots were permitted to work up to fifty-five duty hours in any seven consecutive days, while Alan Mann Helicopters pilots could expect to fly up to sixty duty hours a week.[107]

Though the widespread use of variations was, in and of itself, disturbing for trade unions, one issue caused particular concern: exemption from CAP 371. Companies without approved schemes were legally allowed to operate in compliance with the limitations laid out in CAP 295, which were, trade unions argued, less restrictive than CAP 371. As BALPA's chairman, J. H. Wickson, argued in a letter to Bader in July 1975:

> There must be many ways around the new requirements, and there are some operators who will not hesitate to seek them out to gain commercial advantage over their competitors. We know that there are responsible operators who have produced schemes under the new requirements. I have been told, nevertheless, that there are those who do not yet have approved schemes and who have thus been given dispensation to operate under the old limits.[108]

Wickson's concern was valid. In 1975 a number of airlines intentionally submitted schemes to the FTLB that would be rejected in an attempt to exploit this regulatory loophole. Monarch Airlines, for example, deliberately frustrated the approval process so that operations could continue under the limits set out

[106] Ibid. p. 3.
[107] TNA DR/13/1, Flight Time Limitations Board, Minutes of Meeting, 13 November 1975.
[108] TNA, DR 13/6: Letter from J. H. Wickson to Douglas Bader, 25 July 1975, p. 2.

in CAP 295. Throughout 1974 and 1975 the airline's management team submitted schemes to the FTLB that were 'totally unlike CAP 371'.[109] In a meeting with the FTLB on 19 August 1975 BALPA argued that operators like Monarch Airlines had intentionally 'submitted schemes, knowing that they would be rejected, as a delaying measure'.[110] In October 1975, the TGWU raised similar concerns. Though, the trade union argued in a letter to the FTLB, cabin crew employed by national carriers were mostly operating under conditions recommended by CAP 371, a number of smaller companies were not conforming to the minimum conditions it set out:

> Surely, the whole concept of CAP 371 was to create minimum basic conditions for all flying crews; yet since May 1975, companies have been allowed to seek, and gain, deferment from introduction of the basic conditions specified by CAP 371.[111]

The weight of trade union concerns were acknowledged by the FTLB, but there was little that could be done in these instances.[112] As the FTLB noted in May 1975:

> An operator's scheme should follow the model of the CAP 371 but if it does not, according to Legal Branch, the CAA can only refuse to approve the scheme if an equivalent level of safety is not achieved.[113]

[109] TNA DR 13/1: Flight Time Limitations Board, Minutes of Meeting, 13 November 1975, p. 1.
[110] TNA DR/13/1: Flight Time Limitations Board, Minutes of Meeting, 20 August 1975, p. 1; TNA DR/13/1: Flight Time Limitations Board, Minutes of Meeting, 20 August 1975, p. 2.
[111] TNA DR/13/6: Letter from TGWU to Flight Time Limitations Board, 2 October 1975, p. 1.
[112] TNA DR/13/6: Flight Time Limitations Board, Minutes of Meeting, 20 April 1976, p. 1.
[113] TNA DR/13/1: Flight Time Limitations Board, Minutes of Meeting, 21 May 1975, p. 1.

The FTLB were, then, hamstrung in these instances. Despite its subtitle 'Requirements Document', CAP 371 was 'purely a guidance document'.[114] The recommendations it set out had no legal standing. There was, then, no requirement that operators conform exactly, or even closely, to the model of flight time limitations CAP 371 laid out. As the FTLB noted in May 1975, the CAA was only able to reject schemes where 'an equivalent level of safety' to CAP 371 had not been achieved.[115] There were, however, no clear guidelines about what constituted a safe scheme. While it was generally agreed that 'similar limits' to CAP 371 should be deemed safe, and that 'less restrictive' schemes might be unsafe, these were not quantified.[116] There were no agreed upper and lower limits. Since the 'fatigue line' was a 'matter of opinion', the FTLB, rather, assessed each scheme on a case-by-case basis.[117]

In an attempt to mitigate the problems associated with variations, in 1976 the CAA began consultations on revisions to CAP 371. After distributing two draft circulars to interested parties for comment, the second edition of CAP 371 was published in July 1982. In keeping with the philosophy of deregulation favoured by the CAA in the 1980s, it was 'downgraded' from a 'Requirements Document' to a 'Guide to Requirements', clarifying its lack of legal standing.[118] To this end, CAP 371 had been considerably simplified and former requirements had been relaxed.

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[114] Ibid. p. 5.
[115] TNA DR/13/1: Flight Time Limitations Board, Minutes of Meeting, 21 May 1975, p. 1.
[116] TNA DR/13/1: Flight Time Limitations Board, Minutes of Meeting, 1 July 1975, p. 5.
[117] Ibid. p. 5.
[118] Modern Records Centre (hereafter referred to as MRC) MSS 248/8/1: Anon, 'Flight Time Limitations Special CAP 371 Mk. II', *The Log,* 43, 4 (1982) 1-2, p. 1.

Trade unions opposed these changes. BALPA argued, in a special edition of the union's quarterly publication *The Log*, that CAP 371 had been revised in order to 'ease the administrative burden of the CAA rather than increase safety for pilots and their passengers'.[119] The CAA, BALPA contended, had 'passed the buck' of responsibility for air safety to trade unions and airline operators which, the Association argued, was dangerous as airlines sought to take advantage of 'lax' regulations for commercial gain.[120] The new iteration of CAP 371 marked, BALPA argued, a return to the system of control in place until 1957, which relied on industrial agreements between aircrew and operators:

> Flight time limitations, which BALPA has seen historically as being primarily concerned with flight safety and thus non-industrial, have now been stretched to such limits that they have been put very much in the same category as accommodation, promotion and conversions … to be negotiated industrially.[121]

This argument was overstated. Throughout the century flight time limitations of the kind introduced in 1975 remained in place. Though the updated edition of CAP 371 introduced in 1982 was less detailed than its previous iteration, the general principle, which required that work, rest, and time off be balanced across duty cycles, remained intact. The changes to CAP 371 were, for the most part, minor but the tone of the guidelines shifted. The language of the revised edition of CAP 371 recognised pre-existing limitations. It marked a

[119] Ibid. p. 1.
[120] Ibid. p. 1.
[121] Ibid. p. 1.

pragmatic realisation on the part of the CAA rather than a paradigmatic shift in regulatory policy. CAP 371 was, from the outset, flexible and permissive. The updated edition merely recognised this. As the following section will demonstrate, however, the deregulatory philosophy popularised by the Conservative Party in the late twentieth century permeated civil aviation in the middle and late 1980s and early 1990s.

The Confidential Human Factors Incident Reporting Programme

In the late twentieth century neoliberalism increasingly influenced government policy.[122] Neoliberalism has received a multitude of definitions but, at heart the term denoted the conviction that the state needed to roll-back and allow unfettered markets to deliver all goods and services in order to achieve a more efficient and equitable distribution of resources than possible under state direction. The only role for the state in these visions was in creating an efficient framework and incentive system for individuals and businesses to conduct economic exchange.[123] Accordingly, command-and-control forms of regulation, whereby the activities of individuals and companies were regulated directly through legislation, gave way to forms based on compliance and self-regulation. The government and associated agencies thus became, as Sirrs has put it, 'less direct and less visible'.[124] The Conservatives' deregulatory agenda was broad. It encompassed the privatisation of national industries as well as legal reform, but workplace regulations received particular attention.

[122] Jackson, 'The Think-Tank Archipelago'.
[123] Rollings, 'Cracks in the Post-War Keynesian Settlement?'.
[124] Christopher Sirrs, *Health and Safety in the British Regulatory State, 1961-2001: The HSC, HSE and the Management of Occupational Risk*, PhD Thesis, (London School of Hygiene and Tropical Medicine, 2016).

Indeed, a number of white papers produced in the 1980s identified health and safety at work as part of an insidious problem of 'red tape' and over-regulation.[125]

The CAA was not formally affected by any of the Conservatives' deregulatory reforms. As noted previously, the CAA was officially outside of government control, a quango rather than a state department.[126] The CAA was, however, influenced by government rhetoric and policy, and in the 1980s adopted its own deregulatory agenda. The Authority relaxed a number of rules relating to competition and domestic fares. From the 1980s fares no longer needed prior approval, and the CAA only stepped in where there was evidence of monopoly or unfair practices. As part of this broader deregulatory project, the CAA also reconsidered the regulation of aircrew schedules. As noted above, in 1982 flight time limitations were relaxed in the amended version of CAP 371. In addition, from the early 1980s the CAA increasingly ceded much of its regulatory control to other agencies, particularly on issues relating to human factors.

Though a detailed system of flight time limitations was introduced in the 1970s, flight deck and cabin crew continued to complain of fatigue throughout the late twentieth century. The 1980s saw an increasing number of informal reports from pilots about the negative effect of human factors on performance and flight safety. Pilots attributed these issues to increasingly busy schedules as a result of economic deregulation, which had allowed a number of new low-cost operators to enter the market. Many of these were more

[125] Ibid. p. 277.
[126] Michael Cole, 'Quangos: The Debate of the 1970s in Britain', *Contemporary British History*, 19, 3 (2005) 321-352.

commercially motivated than the traditional flag carriers. Employment of pilots was one of the major costs for airlines – after aircraft and fuel – and new low-cost airlines were keen to ensure a good return. This meant, essentially, that pilots employed by small airlines were, in many cases, scheduled to work the maximum number of hours legally possible. The CAA was reluctant to introduce further regulations but, in an attempt to mitigate the concerns of flight crew, established a confidential reporting service – the Confidential Human Factors Incident Reporting Programme (CHIRP) – in 1982.

The official aim of CHIRP, according to co-founder Paul White, was 'to get people to talk'.[127] Pilots were asked to share concerns about the effect of human factors on flight safety and to report any potentially dangerous incidents. To encourage reporting, CHIRP was run independently from the CAA.[128] It was housed within the RAF Institute of Aviation Medicine (IAM) in Farnborough and staffed entirely by former pilots, the assumption being that workers were more likely to talk frankly to individuals with first-hand experience of commercial aviation. Paul White cited his 'wide experience' of flight as one of the reasons he was chosen to work at CHIRP:

> One of the things that I found when I was working at CHIRP, because I'd got wide experience, because I'd been frightened to death many times in airplanes, when somebody said 'I had an engine failure, I had a fire in the airplane … the wheels wouldn't come down, I had this that and the other', I could say 'oh and did this happen as well' and they'd say 'yeah how'd you know that?' and I'd say 'it's happened to me'. You get the rapport and you get people opening up and letting you know

[127] Interview with Paul White, 17 March 2016.
[128] Ibid.

> what's going on. Very difficult to do that with an answerphone or with somebody who hasn't flown airplanes.[129]

There is likely some truth to these foundation stories – that CHIRP needed to be independent and informal in order to foster a culture of openness and honesty – but the formation of CHIRP can also be read as an attempt by the CAA to delegate responsibility for flight safety elsewhere.

The issues experienced by flight crew were shared by CHIRP in Incident Reports, which were made available in crew rooms for pilots to peruse and recurrent issues were reported to regulatory bodies, including the FTLB.[130] The impact of Incident Reports was thus intended to be two-fold: to impact pilot behaviour from the bottom up, and to influence regulatory policy from the top down. In reality, though, CHIRP Incident Reports had limited impact on regulation. Though CHIRP reported dangerous incidents to the CAA, as the Authority was reluctant to introduce new regulations, CHIRP Incident Reports rarely engendered change. As founder members of CHIRP Roger Green and Roy Skinner put it in 1987, five years after CHIRP was first established:

> The point of CHIRP, of course, is to bring incidents … to the attention of the authorities, so that action may be taken which will prevent a similar accident. Sadly, rectifying a problem is not as easy as identifying it.[131]

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[129] Ibid.
[130] Confidential Human Factors Incident Reports: Feedback No. 9, December 1985, available at https://www.chirp.co.uk/newsletters/air-transport [last accessed 23 March 2016].
[131] MRC MSS.248/8/1: Roger Green and Roy Skinner, 'CHIRP and Fatigue', *The Log*, 48, 5 (October 1987) 6-11, p. 7.

In spite of the organisation's initial aim – regulatory impact – by the mid-1980s, then, the dissemination of information was CHIRP's chief remit.

Many of the Incident Reports circulated by CHIRP covered issues concerning fatigue and flight time limitations. Between 1982 and 1987 over one third of reports focused on issues relating to sleep, fatigue, or rostering.[132] Some were cautionary in nature. A number of reports, for example, alerted others to 'inherently dangerous approaches' to airports and issued warnings to take extra precautions when fatigued.[133] Others offered advice about coping with fatigue in flight. Some recommended introducing additional periods of bunk rest on flights with three person crews, with one pilot resting while the others worked.[134] As one anonymised account described:

> Fortunately on the normal three crew 747 we all take it in turns to have a sleep especially if bunks are fitted and this greatly enhances the safety of the operation. I know of Captains who keep to the law and do not allow this. I pity their crews on some flights. If and when I fly a two crew 747 and it is 6am my local body time I shall have a nap. I am not superhuman or specially trained to stay awake.[135]

Others suggested that cockpit floodlights be kept on when the crew was tired and finally, in line with earlier military practice, some reports advocated the use of stimulants and hypnotics.[136] A number of reports recommended

[132] Ibid.
[133] Confidential Human Factors Incident Reports: Feedback No. 15, December 1987, p. 5, available at https://www.chirp.co.uk/newsletters/air-transport [last accessed 23 March 2016].
[134] For example see: Confidential Human Factors Incident Reports: Feedback No. 5, August 1984, available at https://www.chirp.co.uk/newsletters/air-transport [last accessed 23 March 2016]; Confidential Human Factors Incident Reports: Feedback No. 8, August 1985, available at https://www.chirp.co.uk/newsletters/air-transport [last accessed 23 March 2016].
[135] Confidential Human Factors Incident Reports: Feedback No. 19, April 1989, p. 4, available at https://www.chirp.co.uk/newsletters/air-transport [last accessed 23 March 2016].
[136] Confidential Human Factors Incident Reports: Feedback No. 5.

sleeping pills prior to night flights to ensure adequate sleep during the day, when many found sleep was more difficult.[137]

The coping mechanisms recommended in CHIRP Incident Reports were widely employed by crew members. As Chapter Five describes, informal rest periods were widely popular in British airlines, and sleeping pills were used by a number of men and women employed as cabin attendants.[138] Many crew members, though, employed strategies learned elsewhere. Some relied on the coping mechanisms they were introduced to during military service. The use of alcohol as a soporific was common, particularly among pilots with RAF backgrounds. As one former fighter pilot who later worked in civil airlines put it:

> We used to have monumental piss ups um and you'd think nothing about going to bed very much the worse for wear [but] that sort of thing was considered sort of more or less acceptable back then.[139]

This practice was used to both induce sleep and cope with the psychological strains and stresses associated with long-haul operations.[140] Over-use of alcohol was a common coping mechanism in a number of professions in the twentieth century. The practice was so widely employed that, according to Alison Haggett, employers were advised to be alert to absences on Monday

[137] For example see: Confidential Human Factors Incident Reports: Feedback No. 15; Confidential Human Factors Incident Reports: Feedback No. 19.
[138] The practice of controlled rest is discussed in Chapter Five.
[139] Interview with James Hall, 30 March 2016.
[140] Interview with Patrick Smith, 3 February 2017; interview with Matthew Hart, 26 January 2017; interview with James Hall, 30 March 2016.

mornings, since this might indicate a weekend of excessive alcohol consumption.[141]

Alcohol abuse was but one means of coping with psychological disorders beyond medical purview. Resistance to medicalisation was a common thread in the management of flying fatigue on both sides of the Atlantic. As sociologist Roberta Lessor described, self-care practices were well entrenched in American airlines by the 1970s:

> These self-care strategies involved assessment of the effect of the work environment on physical and mental health and the pursuit of activities related to reclaiming, countering, readjusting and replacing the unhealthy practices for the healthy.[142]

Preservation of the self had various implications but usually involved, according to Lessor, either the reclamation of space or the assertion of priority over others. In her study of flight attendants working for American airlines, Lessor found a number of expressions of this, including the substitution of 'good-looking' high-heeled shoes for 'non-regulation', but 'comfortable', footwear.[143]

Cabin attendants and flight crew employed a number of self-care practices in the management of fatigue and circadian disruption. As Lessor described of crew behaviour on the other side of the Atlantic, this mostly involved lifestyle choices:

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[141] Alison Haggett, *A History of Male Psychological Disorders in Britain, 1945-1980*, (Basingstoke: Palgrave Macmillan, 2015).
[142] Roberta Lessor, 'Consciousness of Time and Time for the Development of Consciousness: Health Awareness Among Women Flight Attendants', *Sociology of Health and Illness*, 7, 2 (1985) 191-213, p. 199.
[143] Ibid. p. 200.

> A number of women [flight attendants] have tried to find ways to keep from 'medicalising' their sleep problem by running or aerobic exercises, practising yoga, or transcendental meditation. Some advocate 'just will power' … Those who said that they 'take something if necessary', indicated an increased awareness of the need for moderation in practices that will very likely be continued over a long period of time.[144]

In Britain flight and cabin crews employed similar strategies. A number of the respondents interviewed for this thesis engaged in aerobic exercise. While some ran, others cycled. Several crew members also walked dogs or rode horses during their time off.[145] Others practiced yoga.[146]

Many crew members attempted also to mitigate the effects of fatigue in flight. They relied, like their military counterparts, on the consumption of energy-rich food and drink. Former flight attendant Julia Evans consumed copious cans of Coca Cola in flight. 'I must have drunk', she recalled, 'half of the cans of Coca Cola on the aircraft because it was an instant hit of sugar.'[147] Consumption of sugar-rich and caffeinated beverages was common, at least in part because such refreshments were easily accessible in flight. As Julia Evans described, Coca Cola was the obvious choice, because it was available in the in-flight bar: 'just got to grab it, don't have to fiddle around with it, pull the can, instant hit'.[148] Others found that fatigue was alleviated through dietary control. A number of the respondents interviewed for this thesis said that heavy meals induced feelings of sluggishness and, as such, many

[144] Ibid. p. 201.
[145] Interview with Julia and Jacob Evans, 28 November 2016; interview with Andrew Murray, 4 March 2016; interview with Albert Watson, 5 January 2017.
[146] Interview with Julia Evans, 28 November 2016.
[147] Ibid.
[148] Ibid.

preferred to 'graze' rather than eat full meals while working.[149] Former long-haul flight attendant Jacob Evans, for example, chose to eat simple snacks:

> A banana roll. I used to cross the Atlantic on bananas … Everyone else in the crew would eat first class meals ... I never used to participate in any of that. I used to go bananas only. You'd think I was in a zoo.[150]

Flight and cabin crew developed these coping strategies in part through self-experimentation but, in the main, as a result of exchanges with colleagues. As former cabin attendant Elizabeth Powell described:

> We knew about them, because … once you're in the airline and then you all talk amongst each other, you talk amongst yourselves when you're at the end of a work day. You get a lot of information from sitting around and talking the day out, and because you've had a few problems, and then somebody will say 'oh I've had that problem before and we dealt with it like this'.[151]

Through these informal discussions with colleagues at the end of the work day, flight deck and cabin crew were introduced to a range of coping strategies.

While CHIRP disseminated information about coping with fatigue in Incident Reports, this was but one mode of knowledge transmission. Informal channels of exchange were present throughout the twentieth century and were, it seems, widely used. Indeed, it is telling that CHIRP was referenced by

[149] Ibid.
[150] Interview with Jacob Evans, 28 November 2016.
[151] Interview with Elizabeth Powell, 30 January 2017.

only one of the respondents interviewed for this thesis: Paul White, who was employed by the Programme. It seems, however, that for the most part flight and cabin crew were unaware of or uninterested in reading Incident Reports. An article written by CHIRP workers in 1992 gauged the success of the scheme thus:

> CHIRP has undoubtedly acted as a catalyst for a number of changes that are of clear safety benefit. Even if this were not so, and even if no reports had ever been submitted to CHIRP, the system would still be required. It is a manifestation of the principle that, in aviation, safety is an issue superordinate to any considerations of commercial gain, industrial politics, or disciplinary action; pilots and controllers must be given a means to voice their anxieties about safety freely and without fear of retribution.[152]

In the late-twentieth century, though, the CAA was uninterested in the strict enforcement or revision of regulations except in the most extreme circumstances. As such, while CHIRP had some success engendering technical changes – for example, in relation to flight deck lighting and seat harnesses – its impact on flight time limitations was limited.[153]

The formation of CHIRP represents a shift in the regulation of human factors in civil aviation. Although the formal industry regulator, the CAA, remained intact throughout the late twentieth century, its light touch approach to enforcement meant that the Authority had very little impact on the day-to-

[152] Confidential Human Factors Incident Reporting Programme: Feedback No. 28, December 1992, p. 2, available at https://www.chirp.co.uk/newsletters/air-transport [last accessed 23 March 2016].
[153] Confidential Human Factors Incident Reporting Programme: Feedback No. 24, July 1991, available at https://www.chirp.co.uk/newsletters/air-transport [last accessed 23 March 2016].

day imposition of regulations. External agencies without regulatory powers, such as CHIRP, were instead granted greater responsibility for safety. As it was outside CHIRP's remit to impose guidelines, policy focused instead on the amendment of crew behaviour.

Conclusion: From the Cockpit to the Operating Theatre

In the late-twentieth century the fatigue of healthcare professionals was, increasingly, framed as a danger to patients. Though, as Adam Moreton has demonstrated, concerns of this sort stretch back at least as far as the 1960s, this discourse increasingly gained traction in the 1970s when, in 1975, junior hospital doctors engaged in a limited form of industrial action 'in support of the junior hospital staff contract'.[154] In this period there were, as Morteon has shown, increasing calls for doctors' hours to be regulated. A number of commentators suggested that a system similar to the model of flight time limitations introduced in Britain in 1975 to regulate pilots' hours of work and rest, should be applied to healthcare professionals. In 1988 Simon Durnford, a consultant in aviation medicine based at the RAF IAM, first posited the idea in a comment piece for the *British Medical Journal.* Durnford argued that, while many senior consultants considered the intensive hours worked by juniors as 'a necessary evil, a rite, or even an advantageous education', tiredness might result in reduced medical ability and inadequate care.[155] Both aviation and medicine, he argued, were 'unforgiving of seemingly minor slips': 'A wrong

[154] Adam Moreton, 'The Acrimonious Road to the 48 Hour Week', *British Medical Journal* Blog, Nov 3 2014, http://careers.bmj.com/careers/advice/view-article.html?id=20019902 [last accessed 3 Jun 2015]; Patrick O'Connor, 'Who Will Follow the Juniors Now?', *British Medical Journal*, 2, 6152 (1978) 1660, p. 1660.
[155] Simon Durnford, 'Junior Hospital Doctors: Tired and Tested', *British Medical Journal*, 297, 6654 (1988) 931-932, p. 931.

decimal point, a forgotten drug interaction, or incorrect labelling of right or left and the results may be catastrophic.'[156] As fatigue had implications for patient safety, Durnford argued, the hours worked by junior doctors should be carefully regulated in line with those of flight deck crew.

The following year a study by two consultant anaesthetists – A. Murray Wilson and G. Weston – examined whether this was possible. As Murray Wilson and Weston noted in their 1989 article, though the medical press, 'often referred to these restrictions', their study marked the first formal investigation of CAA guidelines in a medical setting.[157] Murray Wilson and Weston surveyed the workload of junior anaesthetists between March and May 1988. The rules contained within CAP 371 were then retrospectively used to allocate anaesthetists to cover the work that they had performed 'as though scheduling aircrew'.[158] The study found that the number of people required to cover junior anaesthetists' rotas when the guidelines laid down in CAP 371 were followed was 'surprisingly high', suggesting that the workload of junior anaesthetists was excessive.[159]

Though Murray Wilson and Weston questioned the validity of the comparison between aircrew and anaesthetists – anaesthetists, they argued, were only occupied by work between 42% to 62% of the time, and had 'long periods of inactivity when they could take rest' – they nevertheless recommended that the National Health Service (NHS) should introduce rules similar to those employed by the aviation industry to prevent junior hospital

[156] Ibid. p. 931.
[157] A. Murray Wilson and G. Weston, 'Application of Airline Pilots' Hours to Junior Doctors', *British Medical Journal*, 299, 6702 (1989) 779-781, p. 779.
[158] Ibid. p. 779.
[159] Ibid. p. 780.

doctors working unsafe hours.[160] In their conclusion to the study, Murray Wilson and Weston argued that the responsibility for avoiding doctor fatigue lay, ultimately, with NHS Trusts:

> Fatigue is but one of the factors that threaten a person's concentration, but it can be anticipated. There is no excuse for demanding that junior anaesthetists continue working their present unsafe number of hours or for subjecting patients to a new generation of tired doctors. The responsibility for errors resulting from fatigue will belong to those who fail to plan appropriately.[161]

Though junior doctors' associations broadly supported these conclusions, others were more sceptical.

Following the publication of the study, the *British Medical Journal* published a series of critical responses. While some contributions argued that CAP 371-style regulations were 'not economically feasible', others argued that doctors should be responsible for the avoidance of fatigue by taking rest where possible.[162] In other instances, detractors argued that the limits proposed by Murray Wilson and Weston were too restrictive. P. J. Helliwell and M. P. Coplans of the Association of Anaesthetists of Great Britain and Ireland argued, following the publication of the 1989 article that:

> The practice of medicine in general is too unpredictable, and the specialty of anaesthesia too immediate, to warrant the formulation of

[160] Ibid. p. 781.
[161] Ibid. p. 781.
[162] Brian Kennedy, 'Application of Airline Pilots' Hours to Junior Doctors', *British Medical Journal*, 299, 6705 (1989) 974; John A. T. Duncan, 'Application of Airline Pilots' Hours to Junior Doctors', *British Medical Journal*, 299, 6705 (1989) 975.

> strict rules of clinical conduct; thus it is not possible to apply the rigid regulations applicable to, for example, airline pilots directly to practising anaesthetists.[163]

These critical voices reflected the regulatory concerns of parliament. As Moreton has shown, though various iterations of the Junior Hospital Doctors (Regulations of Hours) Bill – which called for a seventy-two hour weekly limit on juniors hospital doctors' hours – were debated in the 1980s, all attempts to introduce working hours legislation of the kind common to civil aviation ultimately failed.[164] The reasons for this are complex, and are worthy of further research. Of course, medicine traditionally resisted regulation, and the financial and bureaucratic concerns of the NHS were expansive.

For the purposes of this thesis the rationale of NHS regulators in their rejection of CAP 371-style limitations is not important. What is crucial, however, is what this episode reveals about how the people of Britain understood and conceptualised flight time limitations in the late twentieth century. That CAP 371 was so widely discussed in the medical press says something about how healthcare professionals perceived the regulation of work and rest in civil aviation. The model of limitations introduced in 1975 was held up, by medical practitioners and professionals in other high-risk industries, as a gold standard, an ideal. It was believed, ultimately, to be safe and was framed as a model to aspire to and, if possible, closely replicate.

The idealistic discourse surrounding flight time limitations in other occupations is interesting, and, no doubt, telling of the lower level of

[163] P. J. Helliwell and M. P. Coplans, 'Application of Airline Pilots' Hours to Junior Doctors', *British Medical Journal*, 299, 6711 (1989) 1341, p. 1341.
[164] Moreton, 'The Acrimonious Road to the 48 Hour Week'.

protections afforded to workers elsewhere. It is, however, ultimately incorrect. As this chapter has shown, reflecting a broader separation of research and policy in civil aviation, flight time limitations were not grounded in evidence. As former pilot Gerard Hunt put it:

> Well actually we weren't data driven, we weren't research and evidence based, compared with doctors, and so if … you said something that they [pilots] kind of could agree with they'd say 'yeah this seems to make sense, I'll do that'.[165]

Flight time limitations were not based on original psychological or physiological research. The committees charged with designing regulations deemed this evidence too crude, and fatigue too medically ambiguous, to engage with. As a result, medical evidence was largely side-lined. Regulatory reviews relied instead, as in wartime studies of flying stress, on expert testimonies. In many cases, regulatory committees privileged the economic and administrative concerns of operators and, as a result, throughout the century flight time limitations were consistently flexible and permissive.

The immediate post-war era ushered in a 'new wave of state interventionism' in some respects.[166] The period is often defined as one of collective provision, with the nationalisation of industry, transport, and healthcare cited as primary examples of this overarching trend. Liberal values, which stressed self-reliance rather than state intervention, however, persisted. As this chapter has shown, throughout the post-war period British

[165] Interview with Gerard Hunt, 8 February 2017.
[166] Greg Eghigian, Andreas Killen, and Christine Leuenberger, 'The Self as Project: Politics and the Human Sciences in the Twentieth Century', *Osiris*, 22, 1 (2007) 1-25, p. 22.

governments were consistently reluctant to extend their regulatory reach. As such, though the work and rest of flight deck and cabin crew was more strictly regulated than in any other industry in post-war Britain, these regulations consistently located the responsibility for fatigue management with individual workers rather than employers or state agencies. Reflecting broader regulatory trends in post-war Britain, pilots were tasked with finding means of balancing work and rest themselves rather than relying on the state.

Civil aviation was but one arena where responsibility for the health, safety, and wellbeing of workers and publics was negotiated in twentieth-century Britain. Debates about fatigue management in civil aviation spoke to and were influenced by broader discussions about health and safety at work and home. Responsibility for the health, safety, and wellbeing of publics and workers was broadly contested and refashioned in the twentieth century.[167] Responsibility was, in the latter decades of the twentieth century, increasingly located beyond the state: with individuals and workplaces, rather than government agencies. Chronic sick patients were increasingly expected to monitor and manage their symptoms themselves, outside of a medical setting. Employers and workers were, from the 1970s, charged with managing health and safety at work. Employees were expected to manage stress, fatigue, and other health issues individually, with lifestyle changes, or with the help of their employer, through stress-management courses. More broadly, publics were

[167] Martin Moore, *A Question of Control? Managing Diabetes and its Professionals in Britain, 1910-1994*, PhD Thesis, (University of Warwick, 2014); Sirrs, *Health and Safety in the British Regulatory State, 1961-2001;* Deborah Palmer, 'Cultural Change, Stress and Civil Servants' Occupational Health, c. 1967-85' in Mark Jackson (ed.), *Stress in Post-War Britain, 1945-85*, (London: Pickering and Chatto, 2015), pp. 95-110; Ayesha Nathoo, 'Initiating Therapeutic Relaxation in Britain: A Twentieth-Century Strategy for Health and Wellbeing', *Palgrave Communications*, 2 (2016), 1-10, available at: http://www.palgrave-journals.com/articles/palcomms201643 [last accessed 20 July 2016].

charged with taking responsibility for their own individual health by engaging in health-promoting behaviours, and curbing bad habits. Broader structural changes were rarely considered.

This chapter has focused predominantly on statutory limitations and guidance from quasi-state regulators, but throughout the twentieth century flight times and rest periods were also controlled by union-airline agreements. Even after the introduction of CAP 371, which proposed universal limits, variations meant that in reality the rules governing the hours of work and rest of aircrew were not the same across the board. Aviation unions – particularly BALPA – played a significant role in the negotiation of variations and, as the following chapter will show, also in airline-specific policies prior to the introduction of CAP 371. What follows examines how, and to what end, aviation unions negotiated hours of work and rest with civil airlines in the twentieth century. The following chapter acts, therefore, as somewhat of a counterpoint to what is discussed here. It engages with many of the same themes but focuses primarily on aviation unions, rather than regulatory agencies. It looks, specifically, at the arguments put forward by BALPA for the reduction of flying and duty hours between 1961 and 1973.

4

Fatigue, Trade Unionism, and Public Relations

On 13 December 1972, an alarming story made national and international headlines: a British Overseas Airways (BOAC) flight crew had fallen asleep mid-flight on route from Sydney to Honolulu. The captain of the airliner carrying 125 passengers was reported to have 'nodded off' over Japan, only to wake and find both of his two co-pilots and flight engineer – his entire flight deck crew – asleep.[1] Although the story was not entirely novel it received an unprecedented level of news coverage.[2] Released to the press by the British Airline Pilots Association (BALPA), it marked a radical new public relations approach for the aviation union.

This chapter examines the events leading up to, and immediately after, the release of the sleeping flight crew story. It is structured in two parts. The first looks at the pay and productivity agreements negotiated by BALPA between 1960 and 1971. During this period fatigue was considered secondary to pay within union negotiations. In line with contemporary regulatory discourse, it was framed as a short-term phenomenon, and BALPA was often prepared to waive claims of fatigue in favour of improved pay and conditions for members. The second looks at the radically different approach to fatigue BALPA adopted in the early 1970s. It examines BALPA's public relations

[1] Arthur Reed, 'Ministry Inquiry over BOAC crew asleep at controls of jet flying 30,000 ft', *Times*, Dec 13 1972, p. 1.
[2] A similar story had been reported in 1971, see: Arthur Reed, 'Airline pilots asleep on duty, MP says', *Times*, Jun 28 1971, p. 1.

policy, with a particular focus on the Association's provocative communications with news media and regulatory agencies between December 1972 and April 1973. Here fatigue became a cumulative issue, and took priority over pay settlements in a bid to solve the scheduling issues that had emerged in the previous decade, in part as a result of the pay and productivity deals brokered by BALPA during this period. Public relations releases about pilot fatigue were central to this new strategy.

As a whole, the chapter seeks to draw out how BALPA, and other contemporary transport unions, framed fatigue in negotiations with employers in the twentieth century. The chapter examines how BALPA interacted with a number of agencies including regulators and associated research committees, notably the Bader Committee, news media, and airlines.[3] It provides another example of how fatigue was negotiated and debated following its emergence as a concern in the first half of the twentieth century, as described in Chapter One and Chapter Two. It thus serves as a counterpoint to the previous chapter. Not only does it engage with a number of the agencies discussed previously, but it also has a number of conceptual links with the previous chapter, particularly in the second section, which examines how BALPA communicated the perceived risks associated with pilot fatigue to the public.

In looking at the workings of BALPA and its engagement with fatigue, this chapter will enter into several well discussed fields. For instance, the relationship between occupational health and trade unionism, which has been the subject of many histories of the workplace. Scholarship has focused

[3] As in the previous chapter the Committee on Flight Time Limitations is referred to as the Bader Committee.

predominantly on the occupational health issues related to manual and heavy labour. Mining, factory work, and the asbestos industry have received particular attention. The key debate in this literature centres on the role played by the Trades Union Congress (TUC) and affiliated unions in the promotion and protection of health within the workplace. Some historians, particularly those interested in asbestos-related illnesses, have suggested that in the twentieth century trade unions made pay a priority to the neglect of health issues.[4] Trade unions have, according to Ronald Johnston and Arthur McIvor, always been in an awkward position regarding occupational health and safety. As the front line of defence against unsafe work practices, their main rationale was to represent their members' interests. This frequently meant that pay and working hours were prioritised over occupational health matters.[5] Johnston and McIvor have been particularly critical of the trade unions that represented workers in the asbestos industry. Self-help and pressure groups, they have argued, made more effort to both publicise the asbestos issue and assert the rights of ill workers.[6] The argument that unions did not do enough to protect their members from occupational health risks dominated historical scholarship on the subject for much of the twentieth century.

In recent years some historians have challenged the prevailing narrative. Scholars such as David Rosner, Gerald Markowitz, Joseph Melling, Mark Bufton, and Vicky Long, have argued that trade unions were just as

[4] For examples of this interpretation see: Paul Weindling, 'Linking Self Help and Medical Science: The Social History of Occupational Health' in Paul Weindling (ed.), *The Social History of Occupational Health*, (Beckenham: Croom Helm, 1985), pp. 2-31; Geoffrey Tweedale, *Magic Mineral to Killer Dust: Turner and Newall and the Asbestos Hazard*, (Oxford: Oxford University Press, 2000); Ronald Johnston and Arthur McIvor, *Lethal Work: A History of the Asbestos Tragedy in Scotland*, (East Linton: Tuckwell Press, 2000).
[5] Johnston and McIvor, *Lethal Work*, p. 147.
[6] Ibid.

concerned with workplace safety and working conditions, as with monetary compensation.[7] Workers and unions, Rosner and Markowitz have argued, often saw disease as rooted in long hours, poor ventilation, and exposure to dusts and other toxins; and low wages that eliminated the possibility of proper housing, clothing, and food were seen to compound the problems of the workplace.[8] The pursuit of fair wages, reasonable working hours, and workplace safety, were, historians have thus contended, often complementary, not competing, aims.

Much has been written about the role of trade unions in industrial bargaining. Attention has focused primarily on the organisation of industrial action. The public relations strategies of unions have, in comparison, received very little attention from historians of work and unionism. This may be because for most of the twentieth century trade unions received poor press. From the 1970s press coverage of union activities was particularly negative. James Curran and James Seaton have gone so far as to say that the trade union movement was weakened by media coverage.[9] Reporting of industrial relations tended to focus on conflict. It was framed in terms of its harmful consequences, not the causes of worker dissatisfaction. The three most frequently recurring themes in national daily reports of industrial disputes in 1975 were, as Curran and Seaton have outlined, loss of output, loss of work

[7] For examples of this interpretation see: Mark W. Bufton and Joseph Melling, 'Coming Up for Air: Experts, Employers, and Workers in Campaigns to Compensate Silicosis Sufferers in Britain, 1918-1939', *Social History of Medicine*, 18, 1 (2005) 63-86; Vicky Long, *The Rise and Fall of the Healthy Factory: The Politics of Industrial Health in Britain, 1914-60*, (Basingstoke: Palgrave Macmillan, 2011).
[8] David Rosner and Gerald Markowitz, *Deadly Dust: Silicosis and the On-Going Struggle to Protect Workers' Health*, (Michigan: University of Michigan Press, 2006).
[9] James Curran and Jean Seaton, *Power Without Responsibility: The Press, Broadcasting, and New Media in Britain*, sixth edition, (Oxford: Routledge, 2002).

by those not involved, and inconvenience or danger to the public.[10] In general, the national press endorsed the basic tenets of the capitalist system: private enterprise, profit, the free market, and the rights of property ownership.[11] On the whole the mainstream media were not interested in reporting union rationale for industrial action. As a result, most trade union officials regarded the press as adversaries.[12]

In some instances, though, unions benefitted from communication with the mass media. Melling has shown that Clive Jenkins (1926-1999) of the Association of Supervisory Staffs and Executive Technicians (ASSET) used the national press to his advantage. He proved, according to Melling, a ready litigant who drew a considerable income from successful libel actions against the press.[13] Jenkins also founded and edited *Trade Union Affairs* as a forum for serious debate on industrial strategy and public policy. According to Melling, much of the success Jenkins enjoyed by the 1960s can be attributed to his skills as a writer, broadcaster, and self-publicist.[14]

These public relations activities, however, rarely focused on issues of fatigue. Indeed, the proliferation of fatigue and exhaustion among workers was not a major concern of trade unions until the second half of the twentieth century. Before this time, unions tended to be more interested in immediate workplace dangers. Traumatic injuries and deaths at work were afforded a higher profile than the longer-term effects of insidious and invisible

[10] Ibid.
[11] Ibid.
[12] Joseph Melling, 'Managing the White-Collar Union: Salaried Staff, Trade-Union Leadership, and the Politics of Organized Labour in Postwar Britain, c. 1950-1968', *International Review of Social History*, 48 (2003) 245-271.
[13] Ibid.
[14] Ibid.

occupational health issues, like fatigue. As noted by Long, a greater ambivalence surrounded ailments which could be exacerbated by workplace conditions but which were found in the population at large.[15] Fatigue was a common complaint among the British populace in the twentieth century. According to Edward Shorter, in the 1920s roughly one in five patients visited the doctor complaining of tiredness and malaise.[16] Fatigue was, as such, low on the list of union priorities. When unions mentioned fatigue before the 1950s it tended to be in relation to traumatic injuries when, for example, fatigued workers were involved in factory accidents.[17]

This chapter marks a break with previous scholarship in two key ways. First, it shifts the focus on heavy and manual industries to a sedentary, skilled profession: civil aviation. Throughout the twentieth century pilots were highly paid and civil aviation – a 'young and dynamic' industry – was held up by the mainstream media as a prestigious and modern profession.[18] Second, pilot fatigue occupies a more ambiguous position than many other occupational health complaints. As noted in Chapter Three fatigue, unlike most work-related ailments, was not exclusively an issue of worker welfare. There were two major points of difference. On the one hand, within the aviation industry, pilot fatigue was a serious safety concern. More liable to misjudgements when fatigued, a tired pilot was potentially a danger to passengers. The close relationship between the occupational health of workers and passenger safety

[15] Long, *The Rise and Fall of the Healthy Factory.*
[16] Edward Shorter, *From Paralysis to Fatigue: A History of Psychosomatic Illness in the Modern Era*, (New York: Free Press, 1992).
[17] Roger Cooter and Bill Luckin, 'Accidents in History' in Roger Cooter and Bill Luckin (eds.), *Accidents in History: Injuries, Fatalities and Social Relations* (Amsterdam: Rodopi, 1997), pp. 1-17.
[18] Mark L. Kahn, 'Regulatory Agencies and Industrial Relations: The Airlines Case', *The American Economic Review*, 42, 2 (1952) 686-698, p. 686.

meant that unions and employers perceived pilot fatigue differently to other work-related health concerns. On the other hand, pilot fatigue was inextricably linked to working hours and scheduling, a major bone of contention between unions and employers from the 1950s onwards. Balanced scheduling, unions argued, could prevent the onset of fatigue. Scheduling, flight time limitations, and fatigue thus became interwoven in union rhetoric and operator-union negotiations. When making the case for a reduction in pilot fatigue for reasons of health and safety, unions were also, in effect, campaigning for changes to working hours and conditions.

Discussions about fatigue, health, safety, and working hours were not limited to the aviation industry. Several other industries, particularly those that employed professional drivers, such as the railway and goods transportation industries, saw similar arguments from unions in the twentieth century. For example, in the 1930s London bus drivers complained that intensive scheduling and 'speed up' affected worker health and was a major cause of a gastric illness known as 'busman's stomach'.[19] In this instance illness played a crucial mediating role in the negotiations between unions and employers. Indeed, Rhodri Hayward has suggested that busman's gastritis was central to the Transport and General Workers' Union's (TGWU) case. Part of the radicalism of the union's claim lay, according to Hayward, in its ability to turn a dispute about working practices into a clinical debate about the aetiology of disease.[20] Pilot fatigue was, then, one of many different manifestations of wider social concerns about working hours, fatigue, and stress in twentieth-

[19] Rhodri Hayward, 'Busman's Stomach and the Embodiment of Modernity', *Contemporary British History*, 31, 1 (2017) 1-23.
[20] Ibid.

century Britain. This chapter seeks to deconstruct and analyse why the relationship between fatigue, safety, and working hours gained increasing cultural purchase in the late twentieth century and asks whether, given its nebulous nature, fatigue was a useful bargaining tool for unions in industrial negotiations.

Productivity, Pilot Utilisation, and Trade Unionism in Post-War Britain

The term 'white-collar worker' comes laden with different meanings and assumptions. For much of the twentieth century the term referred to non-manual workers. In his 1970 study of white-collar unionism, professor of industrial relations George Sayers Bain (1939-present) suggested that the term encompassed:

> Foremen, overlookers, and supervisors; scientists, technologists, and technicians; clerical and administrative workers; security personnel; professions; salesmen, commercial travellers, and shop assistants; government administrators and executive officials; and specially 'creative' occupations such as artists, musicians, and entertainers.[21]

These groups, according to Bain, saw themselves as 'belonging more to management than with manual workers, and are generally regarded by manual workers as one of "them" rather than one of "us"'.[22] White-collar workers were increasingly unionised from the middle of the twentieth century. According to McIvor membership was up by 50% between 1939 and 1950,

[21] George Sayers Bain, *The Growth of White-Collar Unionism*, (Oxford: Clarendon Press, 1970), p. 4.
[22] Ibid. p. 4.

from 6.3 million to 9.3 million.[23] By 1960 there were 280 white-collar unions and nineteen partially white-collar unions, which made up almost 20% of the total TUC membership.[24] As Bain suggested in 1970, however, in real terms the degree of unionisation among white-collar workers was 'considerably less' than that found among manual workers.[25] According to Bain by 1970 only 30% of the white-collar workforce was unionised, compared with 50% of the manual workforce.[26]

The transport sector was highly unionised in comparison with other white-collar occupations. In 1965 it was second only to mining, the archetypical unionised industry.[27] Aviation, as a whole, was heavily unionised. Both flight deck and cabin crew were highly represented. The propensity to unionisation in civil aviation can be explained by the long spells workers spent away from home. In the middle and late twentieth century, long-haul crews were scheduled on trips that lasted for weeks at a time. During these periods, crew members relied on unions to represent their interests. As former cabin attendant Elizabeth Powell recalled:

> So often when things were happening back here [in Britain] you had to rely on … your union to protect your better interests because you might be … down in Australia. Where … we're not part of the balloting and so on and so forth.[28]

[23] Arthur McIvor, *Working Lives: Work in Britain since 1945*, (Basingstoke: Palgrave Macmillan, 2013).
[24] Bain, *The Growth of White-Collar Unionism*.
[25] Ibid. p. 37.
[26] Ibid.
[27] McIvor, *Working Lives.*
[28] Interview with Elizabeth Powell, 30 January 2017.

It was, according to Elizabeth Powell, for that reason that flight deck and cabin crew 'all joined the unions in those days'.[29]

Even in instances where white-collar workers were heavily unionised, as in the transport sector, contemporary commentators tended to perceive white-collar unions in different terms to the unions that represented manual workers. White-collar unions were thought to be more conservative than manual unions and more concerned with status. One such measure of this was their reluctance to affiliate to the TUC or the Labour Party. From the middle and late twentieth century, however, white-collar unions increasingly affiliated to the TUC. Indeed, in the 1960s and 1970s a number of politically conservative unions, including the National and Local Government Officers' Association and the National Union of Teachers, affiliated with the TUC.

The 1960s and 1970s were, according to Ronald Johnston and Elaine McFarland, characterised by closures, redundancies, and political agitation.[30] In this respect civil aviation was similar to several other industries, including mining and healthcare, where union members dissatisfied with working conditions and job security engaged in frequent industrial action. [31] It was in this context of industrial unrest that BALPA negotiated with airline managements on issues of fatigue and working hours.

Formed in 1937 by Eric Lane-Burslem, by the mid-1960s BALPA was by far the largest union representing pilots and flight deck crew in Britain. By 1966 almost 90% of pilots across all British airlines were represented by

[29] Ibid.
[30] Ronald Johnston and Elaine McFarland, 'With God in the Workplace: Industrial Chaplains in Scottish Heavy Industry, 1970s-1990', *Oral History*, 38, 1 (2010) 55-67.
[31] A. N. J. Blain, *Pilots and Management: Industrial Relations in the UK Airlines*, (London: George Allen and Unwin, 1972), p. 25.

BALPA.[32] BALPA was a white-collar union and, as such, BALPA representatives were keen to stress the professional expertise of the Association's members. BALPA did not present itself as a trade union, but, like teaching unions and medical associations, as a professional organisation that shared neither interests nor methods with unions representing manual workers.[33] In spite of this lack of congruence with the goals and methods of other unions, BALPA affiliated with the TUC in 1943. The Association's relationship with the TUC was, however, precarious throughout the twentieth century. BALPA often failed to implement TUC policy, particularly with regards to the use of negotiators.[34]

The policies pursued by British trade unions, and especially by white-collar unions in the second half of the twentieth century, remain the subject of vigorous debate. Many writers have contrasted the egalitarian principles of these institutions and the radical rhetoric of their leaders with the narrow sectional interests that they served in practice.[35] BALPA was no exception. Although no academic histories have been written about the Association, contemporary lay commentators were often critical of its procedures and policies. BALPA was criticised, variously, for employing controversial public relations strategies, the unprofessional nature of its negotiations, and its policy, in the 1960s, of privileging pay over health and safety concerns.[36]

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[32] Ibid.
[33] R. D. Coates, *Teachers' Unions and Interest Group Politics: A Study in the Behaviour of Organised Teachers in England and Wales*, (Cambridge: Cambridge University Press, 1972); Kelly Loughlin, '"Your Life in Their Hands": The Context of a Medical-Media Controversy', *Media History*, 6, 2 (2000) 177-188.
[34] John Bentley, 'Pearson Prevails on Pilots: BALPA Returns to the National Joint Council', *Flight International*, Mar 14 1968, p. 368.
[35] Melling, 'Managing the White-Collar Union'.
[36] Modern Records Centre (hereafter referred to as MRC) MSS.248/4/3, Anon, 'Capten, art tha sleepin' there above?', *Guardian*, Dec 14 1972.

Although it courted controversy throughout the twentieth century, BALPA played a major role in almost all industrial negotiation, arbitration, and strike action within the aviation industry in the twentieth century.[37]

BALPA first referred to fatigue in negotiations with airline managements and state regulators in the 1950s. In this period there were no regulations governing the length of single duty periods and it was not uncommon for pilots to fly schedules requiring as much as twenty-four hours continuous duty.[38] These working practices were generally accepted by pilots in the inter and immediate post-war years. According to Blain this was because in the 1930s and 1940s aircraft tended to travel at relatively slow speeds and services were 'relatively infrequent'.[39] Pilots were, therefore, often content to accept long duty periods in order to avoid standing by for extended periods, particularly if it meant they were permitted more days off at home. By the early 1950s, however, scheduling had become a source of continuous dispute between aviation unions and airline operators. Although limits were in place – pilots were not allowed to exceed 1,000 flying hours a year, and were entitled to an average of seven days off each month – BALPA became increasingly anxious about a growing tendency among certain operators to exceed the agreed restrictions. Following a serious aviation accident

[37] The Association amassed a huge number of records, now stored in the Modern Records Centre and, to a lesser extent, The National Archives. Records from these archives, alongside a number of newspaper and other news media sources form the basis of this chapter. As this chapter focuses predominantly on BALPA, much subsequent discussion is dominated by issues relating to pilots and co-pilots. Other crew members are discussed in the chapter that follows.
[38] Blain, *Pilots and Management*.
[39] Ibid. p. 238.

supposedly caused by long working hours and crew fatigue in 1954 BALPA made fatigue its number one priority.[40]

BALPA published a memorandum on flight time limitations on 2 December 1954 through which the Association attempted to influence the Bowhill Working Party.[41] The memorandum sought to exploit the blurred lines between health, safety, and social concerns that fatigue encapsulated. An article published in the Association's journal *The Log* stated that:

> It may be desirable to campaign for the medical and social objective simultaneously, arguing that, if the social objectives are achieved, then the medical and safety objectives will automatically be covered.[42]

To this end, the memorandum called for specific and detailed regulations, with different maximum duty hours depending on the nature of the flight, rather than the blanket limitation of 1,000 flying hours a year that had been in place since 1947. It also recommended that more rest time should be spent at home, arguing that fatigue and stress were likely to accrue the longer one spent away from loved ones and creature comforts. The Bowhill Working Party was not convinced by BALPA's memorandum.[43] The committee's final report, published on 15 December 1954, argued that BALPA's memorandum failed to show that a relationship existed between 'the limitations proposed and the arguments presented in support of them'. The Bowhill Working Party

[40] The National Archives (hereafter referred to as TNA) BT/248/110: BALPA Memorandum, 'Flight Time Limitations', 2 December 1954.
[41] As in the previous chapter, the Working Party on Operating Crew Fatigue and Flight Time Limitations is referred to as the Bowhill Working Party.
[42] TNA BT/248/110: extract from *The Log*, 'Fatigue Control By Legislation', 3.
[43] TNA BT/248/110: Working Party on Operating Crew Fatigue: Minutes of the Fourth Meeting Held on 3 September 1954, p. 2.

also criticised BALPA for presenting a solution that was 'too complicated to be effectively translated into statutory requirements'.[44] The report concluded that BALPA had exaggerated the dangers of fatigue:

> The unions' allegations are unsubstantiated and … there appears to have been some truth to the operators' suggestion that the unions' object in making these allegations is to further their aim of using the problem of fatigue to achieve an industrial end.[45]

BALPA's first attempt at using fatigue to negotiate for more favourable working conditions was, thus, ineffective. What follows outlines how the Association recycled and repackaged fatigue in its negotiations with airlines and state regulators in the 1960s and 1970s.

The British Airline Pilots Association, Pay, and Productivity

In the 1960s BALPA entered into a series of negotiations with airlines centred on pay and productivity. As noted in Chapter Two, in this period air tourism expanded considerably and airlines sought to rework roster arrangements to meet this growing demand. In this context, BALPA had a strong bargaining position, which it used to seek increased pay in exchange for more intensive working hours or, as the union framed it in this period, improved productivity.

Productivity, of course, is not a settled term and has historically meant different things. Today, the term 'productivity' refers to a basic economic concept. It is used by economists as a measure of input-output relations both

[44] TNA BT/248/110: Report of the Working Party on Operating Crew Fatigue and Flight Time Limitations, 15 Dec 1954, p. 6.
[45] Ibid. p. 6.

on the microlevel of single firms or factors, and on the macrolevel of large-scale economic systems. Histories of productivity initially centred on economics. From the 1990s Joseph Melling, Alan Booth, Stephen Broadberry, and others explored productivity in relation to manufacturing and industry. Debate centred, particularly, on British economic performance during the 'long boom' (1950-1973) and whether or not there was a 'productivity gap' between Britain and other western European countries at this time.[46] In recent years historical work on productivity has expanded its scope beyond economics. Historians have looked at how the notion of productivity became closely linked with work and the workplace, and have variously examined how it affected working conditions and practices, health and safety, and how the concept became linked with masculinity and work ethic.[47]

In recent years this scholarship has increasingly focused on the human factor in relation to productivity; in other words, how the body of the worker was central to material production. Peter-Paul Bänziger, Marcel Streng, and Mischa Suter take this approach in *Histories of Productivity*. Exploring

[46] See for example: S. N. Broadberry and N. F. R. Crafts, 'Britain's Productivity Gap in the 1930s: Some Neglected Factors', *Journal of Economic History*, 52, 3 (1992) 531-558; Sebastian Ritchie, 'A New Audit of War: The Productivity of Britain's Wartime Aircraft Industry Reconsidered', *War and Society*, 12, 1 (1994) 125-147; Jim Tomlinson, 'Inventing "Decline": The Falling Behind of the British Economy in the Postwar Years', *Economic History Review*, 49, 4 (1996) 731-757; Alan Booth, Joseph Melling, and Christoph Dartmann, 'Institutions and Economic Growth: The Politics of Productivity in West Germany, Sweden and the United Kingdom, 1945-1955', *The Journal of Economic History*, 57, 2 (1997) 416-444; Alan Booth, 'The Broadberry-Crafts View and the Evidence: A Reply', *Economic History Review*, 56, 4 (2003) 736-742; Stephen Broadberry and Nicholas Crafts, 'UK Productivity Performance from 1950 to 1979: A Restatement of the Broadberry-Crafts View', *Economic History Review*, 56, 4 (2003) 718-735; Alan Booth, 'The Manufacturing Failure Hypothesis and the Performance of British Industry during the Long Boom', *Economic History Review*, 56, 1 (2003) 1-33.

[47] For work and working conditions see: Long, *The Rise and Fall of the Healthy Factory*; Alan Derickson, '"No Such Thing as a Night's Sleep": The Embattled Sleep of American Fighting Men from World War II to the Present', *Journal of Social History*, 47, 1 (2013) 1-26; for health and safety at work see: Christopher Sirrs, 'Accidents and Apathy: The Construction of the "Robens Philosophy" of Occupational Safety and Health Regulation in Britain, 1961-1974', *Social History of Medicine*, 29, 1 (2016) 66-88; for masculinity and work ethic see: R. Johnston and A. McIvor, 'Dangerous Work, Hard Men and Broken Bodies: Masculinity in the Clydeside Heavy Industries, c. 1930-1970s', *Labour History Review*, 69, 2 (2004) 135-153.

productivity through the lens of body history, they lay out the aims of the volume as such:

> We are interested in how productivity became both a guiding concept of economic thought and the framing principle of a variety of economic practices. To that end, we systematically related the history of this essentially contested concept to the body, starting from the point of view that the body is an interface, perhaps even *the* interface, connecting the various aspects and histories of productivity. Here the body is an anchor point; it is only in the body – moving, deploying its energy, expending itself – that notions of productivity take concrete form.[48]

The volume's authors use economics as a 'framing principle' but the focus of the essays is on productivity at a human level, specifically, how the concept of productivity has been applied to human bodies in terms of, for example, caloric input and output.[49] Productivity in this volume, as in other recent works, is focused on the energetic body.

The concept of productivity has a long history stretching back to the eighteenth century. During the eighteenth and nineteenth centuries productivist thinking and the concept of productivity had to battle for predominance against other ways of considering production and the economy. Other concepts – namely the bourgeois discourse of moderation and the communitarian notion of duty propagated by Christian churches –

[48] Peter-Paul Bänziger, Marcel Streng, and Mischa Suter, 'Histories of Productivity: An Introduction' in Peter-Paul Bänziger and Mischa Suter (eds.), *Histories of Productivity: Genealogical Perspectives on the Body and the Modern Economy*, (Abingdon: Routledge, 2017), pp. 1-20, p. 2.
[49] Ibid. p. 2.

were equally prominent. In the 1900s these notions were largely displaced, and productivity was established as the most dominant concept in European economics. At this time productivity was conceived as an abstract, optimisable relationship between input, output, and time.[50]

This new formulation of productivity first gained traction in Britain during the First World War under the auspices of the Health of Munitions Workers Committee (HMWC), established in 1915.[51] The relationship between output and conditions of work was then further investigated by the Industrial Fatigue Research Board (IFRB) in the interwar years.[52] As Chapter One has described, the Board sought the most efficient modes of work, rather than the quickest, which brought it into conflict with American schools of scientific management.[53] Indeed, much of the work produced by the IFRB indicated that productivity was closely linked to working hours and rest. The Board suggested that working over a certain number of hours without a rest break was a false economy.[54] Productivity, the IFRB argued, dropped significantly towards the end of a long shift as workers became increasingly bored and tired. The most productive worker, the Board argued, was 'the steady worker'.[55] Workers should not, the IFRB thus reasoned, be compelled to complete work quickly but should be encouraged to maintain a steady pace and take regular rest breaks.

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[50] Peter-Paul Bänziger and Mischa Suter, 'Transformations of Twentieth-Century Productivism: Introduction to Part II' in Peter-Paul Bänziger and Mischa Suter (eds.), *Histories of Productivity: Genealogical Perspectives on the Body and the Modern Economy*, (Abingdon: Routledge, 2017), pp. 113-116.
[51] Long, *The Rise and Fall of the Healthy Factory.*
[52] A. J. McIvor, 'Manual Work, Technology, and Industrial Health, 1918-39', *Medical History*, 31, 2 (1987) 160-189.
[53] McIvor, *Working Lives.*
[54] McIvor, 'Manual Work, Technology, and Industrial Health, 1918-39'.
[55] Anon, 'Fatigue and Output in the Boot Industry', *The Lancet*, 196, 5075 (1920) 1154-1155, p. 1155.

By the 1940s employers and regulators had begun to accept these arguments. The 1941 Annual Report of the Factory Inspectorate asserted that reasonable hours of work and good working conditions were essential to obtain maximum output.[56] In light of this, several employers introduced rest break schemes as a preventative measure to help workers suffering from accumulative fatigue.[57] Alan Derickson has suggested that the 1940s also gave rise to a now familiar workplace institution: the coffee break.[58] The importance of rest breaks in the avoidance of exhaustion and breakdown among workers also permeated popular discourse in the second half of the twentieth century.[59] The field of self-help made frequent references to the importance of rest and relaxation in the maintenance of personal productivity on both sides of the Atlantic. John Edmund Haggai's (1924-present) 1959 self-improvement publication *How to Win Over Worry*, for example, recommended taking an afternoon nap to increase productivity.[60] By the mid-twentieth century then, the importance of rest for productivity had permeated both academic and lay circles.

In the mid-1960s the concept of productivity became increasingly central to discussions of work performance and earnings. In the early and middle twentieth century research had focused mainly on heavy industry and manufacturing, where output was used as a clear measure of productivity. From the 1960s, however, the concept of productivity was generalised to other sectors of industry, including professional and service work. In this

[56] Long, *The Rise and Fall of the Healthy Factory.*
[57] Ibid.
[58] Derickson, "No Such Thing as a Night's Sleep".
[59] Long, *The Rise and Fall of the Healthy Factory*.
[60] John Edmund Haggai, *How to Win Over Worry: A Practical Formula for Victorious Living*, (Michigan: Zondervan, 1959).

period time and motion studies were increasingly carried out in settings where production did not factor. In the early 1960s a number of work studies were carried out in hospitals and general practice surgeries. These were particularly common in the latter, due to a contemporary interest in the efficiency of general practitioners. As David Armstrong has shown, the role of general practitioners changed dramatically in the early and middle twentieth century.[61] The shift from home-based practice to health centre settings strengthened the boundary between domestic life and work, which fundamentally reconstructed the spatial and temporal aspects of practice activity. Under the new system, general practitioners complained of increasing time pressures. As one general practitioner noted in 1962, 'there is indeed, no slack nowadays'.[62] Armstrong has argued that in the interwar years, time had a different meaning in general practice.[63] Hours of work were not formalised. There were no designated off-duty periods. The growth of specialist clinics and health centres in the post-war period, which used appointment systems and opened and closed at set times, however, prompted an increasing acknowledgement and management of time. Time constraints became a structured feature of modern practice work, and produced a particular time orientation among general practitioners.

It was in contexts such as this that work study techniques from industry were advocated. The rationale was, as Armstrong has suggested, to find methods of using time and effort more economically.[64] Drawing on techniques

[61] David Armstrong, 'Space and Time in British General Practice', *Social Science and Medicine*, 20 (1985) 659–66.
[62] L. A. C. Wood, 'A Time and Motion Study', *The Journal of the College of General Practitioners*, 5, 3 (1962) 379-381, p. 381.
[63] Armstrong, 'Space and Time in British General Practice'.
[64] Ibid.

developed by Frank (1868-1924) and Lilian Gilbreth (1878-1972) in the 1920s, the work studies of British general practice carried out in the 1960s outlined a number of design and spatial practices which would economise the work of physicians.[65] As one general practitioner noted in 1965, minor changes to the placement of furniture and resources could have noticeable effects on the time and ease of work.[66] Under Margaret Thatcher's premiership the discourse of productivity was then used as one justification for increasing managerialism in the National Health Service (NHS). As Martin Moore has suggested, managerialism, with its grounding in information and monitoring, had, by the mid-1980s, become a primary means through which the NHS sought to save money and improve efficiency.[67]

The concept of productivity acted as a validation of piecework in other instances. Indeed, the relationship between time, output, and remuneration was made explicit in a number of productivity deals broached in the 1960s and 1970s. In the 1960s the concept of productivity increasingly featured in negotiations between employers and trade unions. The Labour government of 1964-1970 promoted the use of productivity deals as a way of facilitating changes to working practices and wage increases. Productivity deals, for the most part, involved the agreement of workers to changes intended to improve productivity in return for an increase in pay or other benefits. By 1973 one third of all industrial workers were governed by productivity deals.[68] In spite of

[65] Patrick Waterson, 'World War II and other historical influences on the formation of the Ergonomics Research Society', *Ergonomics*, 54, 12 (2011) 1111-1129.
[66] W. D. Jeans, 'Work Study in General Practice', *The Journal of the College of General Practitioners*, 9, 3 (1965) 270-279.
[67] Martin Moore, *A Question of Control? Managing Diabetes and its Professionals in Britain, 1910-1994*, PhD Thesis, (University of Warwick, 2014).
[68] Patrick Kinnersly, *The Hazards of Work: How to Fight Them*, (London: Pluto Press, 1978).

their popularity, productivity deals were controversial. A number of left-wing commentators criticised the system. Tony Cliff (1917-2000), a Trotskyist activist and later founding member of the Socialist Workers' Party, was particularly vocal in his disapproval. Productivity deals, Cliff argued in his 1970 publication *The Employers' Offensive*, harmed workers in two main ways: they worsened working conditions, and they empowered employers rather than workers.[69] As Cliff noted in the closing pages of *The Employers' Offensive*, however, recognition of undesirable consequences and effective resistance to productivity deals were different matters:

> Now comes the 64,000 dollar question – how do we fight a productivity deal? I hope no one who has read this book so far will be in any doubt where I stand on the question of productivity dealing – bitterly and unalterably opposed to it. But this does not in itself solve the problem of developing a strategy for fighting them. Any fool can denounce a productivity deal and say we should have nothing to do with it. It is an entirely different matter to lead a group of workers in successfully resisting such a deal.[70]

In spite of their apparent pitfalls productivity deals were often attractive to workers because of the benefits they entailed.

In the 1960s BALPA brokered a number of productivity deals with British airlines. Between 1961 and 1970 BALPA negotiated with airlines on issues of workload, working hours, and pay on six separate occasions. The Association negotiated with BOAC management twice, and with British

[69] Tony Cliff, *The Employers' Offensive: Productivity Deals and How to Fight Them*, (London: Pluto Press, 1970).
[70] Ibid. p. 215.

European Airways (BEA) management on four separate occasions. A number of the negotiations between BEA and BALPA broke down, specifically, in 1961, 1963, and 1966. As described in Chapter Two, in these instances, BEA and BALPA were referred to arbitration under Hugh Patrick Ruffell Smith (1911-1980), a member of the Royal Air Force's (RAF) Medical Branch between 1938-1961 and a licenced pilot.[71] In each instance Ruffell Smith undertook an investigation of pilot workload and working conditions, and produced a report that advocated flight time limitations based on a points system. One point was allotted for take-off, one point for landing, and one point for every hour of flying. Points were also allotted for unfavourable environmental and flying conditions. Half a point was, for example, allotted when the in-flight temperature exceeded thirty degrees centigrade.[72] In all cases BEA management and BALPA initially accepted Ruffell Smith's system but on two occasions, in 1965 and 1967, there were further negotiations between BEA and BALPA. These negotiations centred on pay and productivity.

The 1965 negotiations encompassed a number of issues. BALPA presented BEA with a list of fifty-five different grievances. Pilot workload and pay were, however, prioritised. The dispute was settled in April 1965, after BALPA called for a twenty-four hour walkout.[73] BEA offered pilots a raft of pay increases including an 8.2% pay increase backdated to October 1964, with further increases of 4.5% in 1966 and 4% in 1967. In return, BALPA accepted

[71] Anon, 'H. P. Ruffell Smith, AFC, MA, MB, BCH', *British Medical Journal*, 281, 6240 (1980) 613.
[72] WL PP/HEW/F.4/8: H. P. Ruffell Smith, 'An Investigation of Pilots' Working Conditions in a Civil Air Line', November 1961.
[73] Anon, 'BALPA and BEA Reach Agreement', *Flight International*, Apr 22 1965, p. 629.

a number of proposals to increase pilot productivity.[74] BEA's chairman Anthony Horace Milward (1905-1981) agreed the pay rise on the basis that pilots disregarded the Ruffell Smith points system. These 'adjustments' would, Milward told pilots, 'enable you [BEA pilots] to put in extra effort, particularly in the summer months'.[75]

In 1967, BALPA and BEA reached a similar agreement. BEA, faced with a crew deficit of fifty-two pilots, proposed an interim policy of 'extra pay for extra work'.[76] BEA had tried to recruit 163 extra pilots, but due, as airline managers put it to BALPA in a meeting on 27 April 1967, to a 'world-wide shortage of airline pilots', only 111 were recruited.[77] With a view to finding a solution to the pilot shortage problem, discussions between BEA management and BALPA representatives were held in April 1967. BALPA expected a considerable number of BEA pilots to volunteer for the 'extra duties' in return for 'reasonable extra payment'.[78] The following terms were agreed:

> a) For the period 1 July to 31 October, temporary major changes in the existing negotiated agreements for flying hours and duty periods have been agreed so that the additional duties required can be obtained.
> b) Rosters would be prepared in accordance with existing agreements and, in the case of pilots who had volunteered for additional duties, these duties will be specially shown in their rosters. All of these extra duties will be undertaken during their normal off-duty time.

[74] Arthur Reed, 'BOAC flights grounded by pilots' strike', *Times*, Mar 31 1969, p. 1.
[75] Ibid. p. 1; this was not the first time that BALPA had reached an agreement with an airline that privileged pay and pilot utilisation over safety. In 1964, the Association reached an agreement with BOAC that promised 'improved productivity' in return for 'improved salary standards' for long-haul pilots, see: MRC MSS.248/8/15, Agreement between BOAC and BALPA, 18 December 1964, p. 1.
[76] MRC MSS.248/1/21: Notes of BEA/BALPA Head Office Meeting, 24 January 1967, p. 2.
[77] MRC MSS.248/3/26: BALPA Notes of Meeting Held Between BEA, BALPA, The Board of Trade, and the Ministry of Labour, 27 April 1967, p. 1.
[78] Ibid. p. 2.

c) Special payments for these extra duties will be negotiated between BEA and BALPA in the normal way.[79]

According to BEA management, this agreement would lead to more flying hours but not more hours of overall work. It was, the airline argued: 'more a question of increased flexibility, rather than an increase in the number of hours of duty'.[80] The agreement was renewed in November 1967 for a further six months.[81] Before the agreement expired a further settlement was reached on 1 January 1968. The new agreement came into effect immediately, and continued in place until April 1969. As in prior iterations, adjustments were made to the Ruffell Smith points system. The aim was to increase productivity to 195 points in twenty-eight days, equivalent to 170 hours of duty a month. It was agreed that duty periods may at times extend to the maximum length permitted under Civil Aviation Publication (CAP) 295 and that rest periods may fall within the 'minima laid down by the Board of Trade'.[82] Essentially then, it was agreed that airlines could schedule right up to the limits laid down in CAP 295.

Following the cessation of this agreement, further talks were held between BEA and BALPA in September 1969. Although BALPA claimed to act in its members' interests, not all pilots were happy with the workload effects of the pay and productivity agreements brokered with airlines in this period. To this end, the 1969 talks elicited heated responses from some pilots.

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[79] Ibid. p. 2.
[80] MRC MSS.248/3/26: BALPA Notes of Meeting Held Between BEA, BALPA, The Board of Trade, and the Ministry of Labour, 27 April 1967, p. 3.
[81] MRC MSS.248/3/26: Memorandum of Agreement for Service Between BEA and BALPA, 1 November 1967.
[82] MRC MSS.248/3/26: Memorandum of Agreement for Service Between BEA and BALPA, 1 January 1968, p. 13.

Captain Stanley Key, who was later implicated in the 1972 Staines air disaster, was particularly critical of the 1969 talks. In a letter to BEA's industrial officer R. F. Trowbridge, Key made two major complaints. First, he complained that BALPA had entered into discussions with BEA without consulting BEA pilots. Secondly, he argued that BALPA's use of the term 'productivity' was inappropriate. 'I would say', Key began, 'that the use of the word "productivity" by our current representatives can only be to pay lip service to the known desire of the majority of BEA pilots to earn more money for more work'.[83]

Reprimands from members did not deter BALPA from entering into further productivity agreements. On 13 June 1970, BEA and BALPA reached a new productivity deal, resulting in a 13.5% increase in pilots' salaries in return for 'increased productivity'.[84] The agreement, which was valid between 18 June 1970 and 27 June 1971, called for an increase in pilot 'work effort'.[85] There was to be a slight change in how extra work was achieved. Previously, productivity deals between BEA and BALPA had focused on more efficient turnarounds to increase the number of sectors pilots could complete in a single day. In the new agreement, however, pilot productivity was increased by 'substituting a duty day for a day off'.[86] Referred to as an 'annotated day', pilots were permitted to substitute up to two days off for duty days in any two consecutive twenty-eight day roster periods.[87] The points accrued by pilots on

[83] MRC MSS.248/3/27: Letter from Stanley Key to R. F. Trowbridge, 9 September 1969, p. 1.
[84] MRC MSS.248/3/27: Appendix to the Minutes of the 115th Meeting of the BEA Pilots Local Council, held on 13 June 1970: Joint Press Statement Issued by BEA and BALPA on 13 June 1970, p. 1.
[85] MRC MSS.248/3/27: BEA Pilots Scheduling Limitations Document: Increase in Work Effort, 1970, p. 1.
[86] Ibid. p. 1.
[87] Ibid. p. 1.

'annotated days' did not count towards the existing weekly and monthly maximum set by BEA, so allowed the airline to schedule pilots for up to fourteen additional points per roster.[88] BEA expected that this system would entail a 10% increase in work effort.

Between 1960 and 1971 BALPA drew on the discourse of productivity, the political 'watchword' of the decade, to buttress arguments for better pay and working conditions.[89] Prior to this, BALPA had shied away from making productivity claims about pilots, preferring instead to stress their professional expertise. The dominant model of productivity in the twentieth century defined worker productivity as the rate of output in a given period.[90] To the twentieth-century layman increased productivity suggested that a greater amount of work was being done in the same timeframe as before. As the above demonstrates, however, debates about productivity were contingent. Though the productionist discourse was dominant, productivity was conceived of in different terms outside the factory. When BALPA referred to pilot productivity, for instance, this entailed efficient deployment of pilots and aircraft. Productivity, according to BALPA, referred to pilot utilisation by an airline, rather than the amount of work a pilot completed in-flight. This discourse of pilot utilisation was at odds with the claims BALPA had made in the previous decade. It was, particularly, contrary to the concerns the Association had raised in the 1950s about the medical, safety, and social implications of pilot fatigue.[91]

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[88] Ibid. p. 1.
[89] MRC MSS.248/4/2: BALPA, 'Flight Fatigue: Report of the Special Committee', second edition, May 1972, with notes by Ninian Davies, p. 37.
[90] McIvor, *Working Lives.*
[91] TNA BT/248/110: extract from *The Log*, 'Fatigue control by legislation', 3.

In real terms, the productivity deals brokered between BALPA and airlines meant that pilots completed more work in fewer days. As a result, pilots worked more intensive schedules but had more time off. As the Bader Committee commented in 1972 of the 1960-1971 pay and productivity deals:

> The outcome of these agreements has been the tendency to concentrate flying and duty hours within a minimum number of days in order to achieve longer uninterrupted periods off duty. This practice has in our view increased rather than reduced the possibility of fatigue.[92]

Increasing the number of uninterrupted days off, BALPA's primary social objective, exacerbated fatigue as it often led to more intensive and imbalanced scheduling by airline operators. BALPA's Flight Fatigue Committee admitted in it's 1972 report that in the 1960s BALPA had 'made concessions' on flight time limitations and working practices based on pay settlements.[93] Essentially, 'a scientifically based system [Ruffell Smith's points system] was set aside in the interests of productivity' and pay increases.[94] These concessions, BALPA admitted in 1972, did not give the 'fullest consideration to safety':

> Thus as part of the negotiations for increased pay, more strenuous working patterns were conceded without full appreciation of their subsequent effects on flight fatigue.[95]

[92] TNA DR/13/4: Douglas Bader, 'Report of the Committee on Flight Time Limitations', June 1973, p. 12.
[93] MRC MSS.248/4/2: BALPA, 'Flight Fatigue: Report of the Special Committee', p. 38.
[94] Ibid. p. 38.
[95] Ibid. p. 37.

In their quest for increased pay, BALPA had drawn on and refashioned a popular discourse – productivity – and, ultimately, exacerbated the conditions under which fatigue was likely.

Transport Unions and Professional Drivers' Hours

In 1967 new flight time limitations – in the form of an updated Air Navigation Order and circular, CAP 295 – were introduced by the Board of Trade with the intention of protecting aircrews against excessive fatigue. These limitations were, however, largely permissive. Although the maximum permissible flying hours were reduced in the 1967 Air Navigation Order from 115 to 100 hours, the regulations introduced under CAP 295 were not legally enforceable. CAP 295 was merely intended to 'assist operators in establishing the principles which should determine the limits and minimum rest periods to be set'.[96] All that operators were legally required to do was introduce a policy about the scheduling of rest periods; they did not need to adhere to specific limits other than those set in the Air Navigation Order.

The 1967 flight time limitations were introduced in a context of wider reforms for professional drivers. The reforms affecting transport workers in other industries were far more detailed and restrictive than those laid out in the 1967 Air Navigation Order and CAP 295. Transport unions were more effective in reducing the hours of professional drivers than BALPA were in reducing the working hours of pilots for two primary reasons. First, unions representing other transport workers prioritised shorter working hours over

[96] Board of Trade, *CAP 295: Flight Time Limitations and Avoidance of Excessive Fatigue in Aircrews*, (London: HMSO, 1967), p. 3.

increased pay. As Hayward has suggested, in the early decades of the twentieth century the TGWU brokered a number of deals with employers that led to tighter schedules in order to secure better pay. [97] By the 1960s, however, the union prioritised working conditions over pay. Shorter working hours, the TGWU argued in this period, would increase driver productivity, so workers would be able to 'get through in 10 hours what … [was previously] done in 11'.[98] Employers would not, the TGWU thus concluded, notice any measurable decline in worker output if drivers' hours of work were reduced. The contrast with BALPA is instructive here. As noted above, BALPA made a similar argument about worker productivity in the 1960s.[99] Rather than calling for reduced working hours, however, BALPA suggested that increased pilot productivity should be rewarded with 'extra pay'.[100]

Transport unions framed fatigue as an issue affecting safety as well as productivity. They held that fatigue increased 'accident proneness' when driving.[101] While they initially framed this as an occupational health risk for drivers who were, transport unions argued in 1961, likely to be involved in a work-related accidents when fatigued, transport unions reframed the issue of fatigue in 1967 as one of public safety.[102] Fatigued drivers, it was argued, were more likely to cause accidents, thus endangering the lives of other road users, and constituting 'a danger to the public'.[103] By emphasising the health and safety of the travelling public, rather than the worker, transport unions

[97] Hayward, 'Busman's Stomach and the Embodiment of Modernity'.
[98] TNA MT/92/107: Letter from J. H. Locke to Minister for Transport, 20 December 1966.
[99] MRC MSS.248/1/21: Notes of BEA/BALPA Head Office Meeting, 25 June 1968.
[100] MSS.248/1/21, Notes of BEA/BALPA Head Office Meeting, 24 January 1967, p. 2.
[101] TNA MT/92/107: Notes of a Meeting held at St. Christopher House to discuss drivers' hours, 8 November 1961, p. 1.
[102] Ibid.
[103] Ibid. p. 1.

were able to secure a number of changes to the general working conditions of professional drivers. By the mid-twentieth century road safety was well-established. Indeed, laws relating to road safety stretched back to the nineteenth century.[104] Traffic accidents and the safety of pedestrians and other road users were deeply embedded in debates about transport and driving by the 1960s.[105] Civil aviation was, however, established post-war and, as the previous chapter has shown, although regulations were produced to ensure safety as it pertained to aircraft in the immediate post-war years, there was little interest in human factors until the mid-1950s.

Following the implementation of the 1967 regulations for professional drivers, and given the fact that the road transport and aviation industries faced similar challenges – namely the impact of technological innovations: faster speeds, long continuous duty hours, and busier roads and flight paths – BALPA reframed its arguments about fatigue to reflect those made by other transport unions. The Association's arguments and objectives shifted in this period. The union's focus on pay and productivity was replaced by a new concern with safety and working practices. This change of approach saw BALPA use stories of sleeping pilots – the most compelling and terrifying manifestation of pilot fatigue – to provoke public support and influence official investigations into fatigue.

[104] Bill Luckin, 'A Never-Ending Passing of the Buck? The Failure of Drink-Driving Reform in Interwar Britain', *Contemporary British History*, 24, 3 (2010) 363-384.
[105] Bill Luckin, 'War on the Roads: Traffic Accidents and Social Tension in Britain, 1939-45' Roger Cooter and Bill Luckin (eds.), *Accidents in History: Injuries, Fatalities and Social Relations* (Amsterdam: Rodopi, 1997), pp. 234-254; Bill Luckin, 'A Kind of Consensus on the Roads? Drink Driving Policy in Britain 1945-1970', *Twentieth Century British History*, 21, 3 (2010) 350-374.

Public Relations, Pilot Fatigue, and Industrial Bargaining

In the 1970s the British media increasingly reported on the health and safety of workers. The national press widely covered, for instance, the publication of the Safety and Health at Work Committee's report in June 1972.[106] One story in particular kept making headlines. Although workers from a number of industries had complained about the potential dangers of fatigue when driving and operating heavy machinery since the turn of the century, in 1972, following reports that an entire BOAC flight crew had fallen asleep mid-flight, workplace fatigue made national headlines. The level of coverage was unprecedented. No other occupational health story received equivalent attention until the late 1970s, when the asbestos scandal began to unfold.[107] Although, as Ayesha Nathoo and Kelly Loughlin have shown, medical issues had been widely reported since the middle of the twentieth century, pilot fatigue was one of the first major occupational health and safety stories to make national news.[108] Prior to the 1970s journalists rarely discussed occupational health and safety, except in relation to high profile disasters which affected publics as well as workers, such as the catastrophic landslide at Aberfan, South Wales in 1966 that killed 144 people.[109]

Against a backdrop of trade unionism and industrial action in the 1970s a number of investigative journalists turned their attention to the field of occupational health and safety. Although similar in content to many of the

[106] See for example: Bryn Jones, 'Big Safety Shake-Up', *Daily Mirror*, Jul 20 1972, p. 4; Alan Hamilton, 'Robens report urges tighter factory safety laws', *Times*, Jul 20 1972, p. 19; Anon, 'Cutting Out The Risks', *Times*, Jul 20 1972, p. 21.
[107] Tweedale, *Magic Mineral to Killer Dust.*
[108] Ayesha Nathoo, *Hearts Exposed: Transplants and the Media in 1960s Britain*, (London: Palgrave Macmillan, 2009); Kelly Loughlin, 'The History of Medicine in Contemporary Britain: Reflections on the Role of Audio-Visual Sources', *Social History of Medicine*, 13, 1 (2000) 131-145.
[109] Sirrs, 'Accidents and Apathy'.

articles that had been published in the 1950s and 1960s on industrial accidents and near misses, the tone and scale of reporting changed in the 1970s. Investigative journalists critiqued the positivist image of British society that had dominated news publications in the years directly following the Second World War. Journalists were particularly critical of supposed advances in medicine, science, and technology. Programmes such as BBC's *Panorama* and ITV's *World in Action* employed dedicated personnel to investigate and report on such matters.[110] The tone of reporting tended to be sceptical and anti-authoritarian, and did not shy away from apportioning blame, particularly to apparently powerful individuals or institutions.

The writing that appeared on occupational health and safety in the early 1970s followed these broad trends. Media outlets engaged with pilot fatigue in a number of ways, but most often used fatigue as a vector through which other issues, often relating to modernity and its apparent discontents, could be discussed. Though in some ways an era of increasing affluence and consumerism, the early 1970s were politically volatile years. Post-war optimism had given way to, as Nathoo has put it, 'a sceptical, anti-authoritarian individualism'.[111] While people across the social spectrum could afford and accepted domestic technologies, this period also witnessed growing public disillusionment with high technology.[112] Aerospace technology offered a potent manifestation of the risks and unintended consequences of technological innovation, and served to exemplify a number of broader themes about the modern world of technology and work.

[110] Nathoo, *Hearts Exposed.*
[111] Ibid. p. 3.
[112] Ibid.

By the 1970s the British media was an important component of contemporary society. The British public were increasingly media-conscious. As entertainment and news information became immediately available, the result of same-day reporting, protests, wars, and social injustices became increasingly visible. The news media provided a platform for issues to be raised and opinions to be heard by vast and disparate audiences.[113] Yet media interest in and reporting of occupational health issues has barely been looked at historically. Given the amount of work that has been published in recent years about the relationship between medicine and the media, it is surprising that media engagement with occupational health and safety has received so little attention from historians of work and medicine.[114] Although some scholars have engaged with issues relating to occupational health and the media – asbestos, for example, has received some attention – this has, for the most part, been brief.[115] Focusing predominantly on the years 1972 and 1973, what follows here examines media engagement with one particularly pervasive hazard for British tourists: the fatigue of airline pilots.

The mainstream media consistently documented issues relating to commercial aviation in the twentieth century. A number of major national newspapers had dedicated air correspondents whose sole purpose was to research and report on industry affairs, be that the building or expansion of airports, industrial action, or air accidents. Henry Serrano Villard has

[113] Ibid.
[114] For example: Susan E. Lederer and Naomi Rogers, 'Media' in Roger Cooter and John Pickstone (eds.), *Medicine in the Twentieth Century*, (Amsterdam: Harwood Academic Publishers, 2000), pp. 487-502; Roger Cooter and Claudia Stein, 'Coming into Focus: Posters, Power, and Visual Culture in the History of Medicine', *Medizinhistorisches*, 42, 2 (2007) 180-209.
[115] Loughlin, 'The History of Medicine in Contemporary Britain'.

suggested that accidents involving commercial airliners often made the most 'sensational headlines'.[116] Given the number of passengers aircraft could accommodate, the potential for loss of life was huge. An air crash thus made for a potentially tragic, and dramatic, story.

In the late 1940s and early 1950s reporting tended to focus on crashes involving military aircraft, in large part because these could carry so many more passengers than civilian aircraft. The Globemaster, a large transport aircraft used by the American Air Force, could for example carry up to 200 passengers. In 1953, when a Globemaster carrying American pilots to Korea after leave crashed in Tokyo, the story was widely reported. Touted as the 'worst crash in aviation history', the Globemaster crash was afforded a far greater word count in the 19 June 1953 edition of the *Times* than two civilian air crashes reported on the same page: a crash between Vientiane and Saigon which killed twenty-five passengers, and a crash near Sao Paulo in which ten passengers and seven crew members were killed.[117] Analysis of these crashes was minimal. In comparison with the Globemaster disaster, which included a consideration of the day's weather and details of the usual service operated by the American Air Force, the *Times* included only the most basic details of the commercial air accidents: the intended destination of the flights and the number of casualties. Throughout the 1950s and 1960s incidents involving military aircraft continued to take precedence. From the early 1970s, however, crashes involving civil aircraft began to be more widely reported, no doubt because by 1970, when the Boeing 747 was first flown

[116] Henry Serrano Villard, *Contact! The Story the Early Birds*, (London: Arthur Barker, 1987).
[117] Anon, '127 Killed in Air Crash: Worst in Aviation History', *Times*, Jun 19 1953, p. 6; Anon, 'Crash in Indo-China: Briton Reported Among Some 25 Victims', *Times*, Jun 19 1953, p. 6; Anon, '17 Killed Near Sao Paulo', *Times*, Jun 19 1953, p. 6.

commercially in Britain, the seating capacity of commercial airliners increased from around 150 in the Boeing 707 up to around 360 in the Boeing 747. The scale of potential human hurt had more than doubled.

Between 1954 and 1972 a number of civil aviation accidents made national headlines: the 1954 BOAC Lockheed Constellation crash, which killed thirty-three of the forty passengers and crew; the 1957 Blackbushe airport crash, which killed all five crew and twenty-nine of the thirty passengers on board; and the 1972 Staines air disaster, which killed 118 people. The public inquiries following each crash were not conclusive, but all pointed towards some error in the skill or judgement of the flight crew. The 1972 crash, involving BEA Trident Papa India, received a significant amount of news coverage, no doubt due to the high death toll. Although the crash was officially attributed to 'an abnormal heart condition', a number of newspaper correspondents focused their reports on other issues.[118] Coverage focused on industrial issues, namely the working conditions of BEA pilots, pilot-management relations, and pilot morale. A number of articles published in the *Times* discussed Captain Stanley Key's long hours of work and 'lack of free weekends'.[119] Drawing on letters of complaint penned by Key in the months preceding his death, the *Times* noted that on several occasions Key had been subjected to long delays before flights – once having to stand-by for five hours before take-off – worked extended hours, and experienced fatigue as a result. The Staines air disaster marked the beginning of what was to be eighteen

[118] Air Accidents Investigation Branch, *Trident I G-ARPI: Report of the Public Inquiry into the causes and circumstances of the accident near Staines on 18 June 1972*, (London: HMSO, 1973), p. 54; Anon, 'Trident pilot's heart trouble started when he was 20, pathologist tells crash inquiry', *Times*, Dec 6 1972, p. 3.
[119] Anon, 'Pilot gave warning of crash risk in using inexperienced crews "two hours before Trident take-off"', *Times*, Nov 29 1972, p. 4.

months of intense media scrutiny of the aviation industry. Only a few weeks after the air crash made headlines a new story broke that had far-reaching implications for the safety of air passengers.

Public relations as a profession first emerged in the early twentieth century. Predicated on the idea that an individual's or company's public image needed to be actively managed by dedicated publicity experts, it was developed alongside professions such as market research. Associated initially with political and corporate cultures, it was first established and institutionalised in America.[120] Public relations, as a distinct profession, flourished in the United Kingdom in the decades following the Second World War. According to Nathoo, by 1963 there were about 3,000 public relations professionals in Britain, more than in any other country.[121] Between 1961 and 1962 the British government spent £4.2 million at home and £20.2 million overseas on its information services. In addition to government departments, many charities, industries, and trade associations began to employ public relations officers.[122] Public relations intended to mobilise public interest, maintain media profiles, and shape policy agendas in line with the aims and interests of a particular organisation.[123]

The operation of public relations and managed communication within the field of health and welfare policy is commonly recognised, although little researched by historians. A number of historians have analysed the development of press and public relations activity in relation to non-

[120] Nathoo, *Hearts* Exposed.
[121] Ibid.
[122] Ibid.
[123] Kelly Loughlin, 'Publicity as Policy: The Changing Role of Press and Public Relations at the BMA, 1940s-1980s' in Virginia Berridge (ed.), *Making Health Policy: Networks in Research and Policy After 1945*, (Amsterdam: Rodopi, 2005), pp. 275-294.

governmental and medical organisations, including the British Medical Association (BMA).[124] Little scholarship has, however, been produced which focuses particularly on how trade unions communicated health and safety information to the public.[125]

The following examines how BALPA communicated information about pilot health – and the implications this had for passenger safety – to the public. It focuses exclusively on public relations in the 1970s, following BALPA's employment of a new public relations officer, Gordon Hurley. Hurley's policies were provocative, and received significant attention from the news media. Although BALPA had engaged with the media before 1972, particularly under general secretary Denis Follows between 1946 and 1962, Hurley's approach was novel. Follows and others had taken a tentative approach to union-public relations. Follows had written short articles for newspapers that set out recommendations for revised flight time limitations. Following the Kallang accident in 1954, for example, Follows wrote a short piece for the *Times* outlining his 'recommendations to the minister' regarding maximum duty hours.[126] Hurley, however, was far more radical. He employed tactics similar to those used by Jenkins and ASSET in the 1960s: he wrote provocative letters to newspaper editors, published a number of articles in BALPA's internal publication *The Log*, and from 1972 alongside other

[124] Loughlin, 'Publicity as Policy'; Peter Bartrip, *Themselves Writ Large: The British Medical Association 1832-1966*, (London: BMJ Publishing Group, 1996); Gareth Millward, '"A Matter of Commonsense": The Coventry Poliomyelitis Epidemic 1957 and the British Public', *Contemporary British History*, 0, 0 (2016), pp. 1-23, available at: http://dx.doi.org/10.1080/13619462.2016.1247701 [last accessed 17 September 2017].
[125] Geoffrey Tweedale's work on the Asbestosis Research Council is a notable exception, see: Geoffrey Tweedale, 'Science or Public Relations? The Inside Story of the Asbestosis Research Council', *American Journal of Industrial Medicine*, 38, 6 (2000) 723-34.
[126] D. Follows, 'Duty Hours of Pilots: Recommendations to Minister', *Times*, Nov 20 (1954), p. 7.

members of the Association began to strategically release material to both the press and members of parliament.[127]

Sleepiness and Sensationalism

The aviation industry experienced an unprecedented period of strife in the late 1960s.[128] Pilot-management relations had soured considerably and, in part because of the pay and productivity agreements brokered by BALPA, pilots increasingly complained about general working conditions and quality of life. Airline operators still had ultimate control of scheduling in this period. The rules contained within CAP 295 were permissive and, as such, operators had to ensure only that aircrew were not scheduled beyond the statutory limitations laid out in the 1967 Air Navigation Order. Pilots were, according to BALPA, often under pressure from airlines to extend duty periods. Under the Air Navigation Order pilots were able to use their discretion to extend duty periods in extenuating circumstances, if for example, flights were delayed due to poor weather conditions. BALPA argued, however, that pilots rarely felt they had a choice in the matter. Fearing retaliation from management, most pilots, the Association argued, felt obliged to extend duty periods regardless of whether they were experiencing fatigue. The purpose of the legislation, 'public protection', was, BALPA argued, thus wholly 'degraded'.[129] BALPA became increasingly concerned with this trend and in 1972 it began, for the second time in twenty years, to campaign for a reduction in pilots' working hours.[130] BALPA claimed that pilot workload had increased considerably since

[127] Melling, 'Managing the White-Collar Union'.
[128] Blain, *Pilots and Management.*
[129] MRC MSS.248/4/2, BALPA, 'Flight Fatigue: Report of the Special Committee', p. 39.
[130] As noted in the previous chapter, BALPA had launched a similar campaign in the 1950s.

1967, when the current government guidelines were introduced in CAP 295. The pattern and size of air traffic had, the Association claimed, 'changed tremendously' and pilots were doing more take-offs and landings, widely acknowledged to be the most fatiguing parts of flying.[131]

Motivated by these concerns, in December 1972 BALPA established a special committee to research and produce a report on the prevalence and severity of fatigue among commercial airline pilots. Marking the now established divorce from scientific discussion of fatigue, the committee researched the issue using two different methods: a survey of members, and a re-examination of past accidents that had been deemed by investigators to be the result of pilot error. All discussion of survey data was removed from the final draft of BALPA's Flight Fatigue Report in response to legal advice, but the media nevertheless reported on much of the information collected.[132]

Several hundred pilots completed the four-page questionnaire published in BALPA's quarterly journal *The Log*. The questionnaire, which looked to gauge how tiredness affected pilot performance, addressed a range of issues including the possible symptoms of fatigue, the impact of fatigue on the safe handling of aircraft, the pilots' pattern of work and rest, and the method by which pilots were woken from sleep before flight. On completing the report pilots were asked to sign, with their name, rank, and company, under the following statement:

> Although I had reservations about the degree of fatigue that might be produced by this duty, I was satisfied that … the safety of neither the

[131] MRC MSS.248/4/3: Anon, 'Danger in the Air? When Fatigue Means Disaster', *Teeside Evening Gazette*, Mar 8 1973.
[132] MRC MSS.248/4/2: BALPA, 'Flight Fatigue: Report of the Special Committee'.

> aircraft nor the persons therein would be endangered if I operated the flight. At a later stage, fatigue … became apparent.[133]

Between 2 and 8 December a total of six news items appeared in local and national newspapers about the survey. Most reports were short, providing only a brief outline of the issues covered in the questionnaire.[134] From 13 December news coverage of the questionnaire and its results accelerated considerably following the release of a report from BALPA claiming that an entire BOAC flight crew had fallen asleep mid-flight on route from Sydney to Honolulu. The captain of the BOAC aircraft carrying 125 passengers was reported to have 'nodded off' over Japan, only to wake and find both his co-pilots and flight engineer asleep.[135] The story was not entirely novel. In June 1971 the *Times* reported that Conservative member of parliament and former pilot Norman Tebbit (1931-present) had 'fallen asleep' whilst on duty.[136] The 1972 story, however, received an unprecedented level of coverage.

In a study of foreign news, Johan Galtung and Mari Holmboe Ruge outlined the qualities likely to make a story. These news values were: frequency (how well the time-span of the event fitted into the news organisation's schedule), threshold (the reach of the event, generally in terms of the number of people affected), unambiguity (an event with a clear interpretation tended, they argued, to be more widely reported), cultural

[133] Anon, 'Pilots Quizzed by Union on Fatigue', *Financial Times*, Dec 4 1972, p. 6.
[134] See: MRC MSS.248/4/3: Anon, '5000 pilots questioned on fatigue', *Glasgow Herald*, Dec 2 1972; MRC MSS.248/4/3: Anon, 'Fatigue Quiz for Pilots', *Western Daily Press*, Dec 2 1972; Anon, 'Pilots Quizzed by Union on Fatigue', *Financial Times*, Dec 4 1972, p. 6; MRC MSS.248/4/3: Anon, 'Quiz on Fatigue', *Middlesex Chronicle*, Dec 8 1972.
[135] Reed, 'Ministry Inquiry over BOAC crew asleep at controls of jet flying 30,000 ft', *Times*, Dec 13 1972, p. 1.
[136] Arthur Reed, 'Airline pilots asleep on duty, MP says', *Times*, Jun 28 1971, p. 1.

proximity (how meaningful the story was in terms of the news audience's own culture), consonance (how well the event matched journalists' expectations), composition (weighting in relation to other news), actions concerning the elite (in the original study this referred to elite nations but it is also applicable to high status occupational groups), personification (events which could be portrayed as the actions of individuals), and negativity (bad news was said to be more newsworthy than good news).[137]

BALPA's sleeping flight crew revelation evidently matched a number of these criteria. It affected a large number of people. By the early 1970s over two million Britons travelled abroad by plane each year. It centered on an elite occupational group and, given the implications for passenger safety, it was overtly negative. There was also an element of continuity. In the days and weeks leading up to BALPA's press release aviation had made more headlines than usual. It had been a particularly bad year for air crashes. Worldwide over 1,700 passengers and crew died in the space of twelve months. The most high-profile crash, the Staines air disaster on 18 June 1972, had taken place a few months previously but was also heavily reported throughout November and early December as the public inquiry into the accident concluded.[138] The story thus continued the theme of human fallibility and passenger safety in commercial aviation that had been widely covered in British newspapers in the preceding weeks.

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[137] Johan Galtung and Mari Holmboe Ruge, 'The Structure of Foreign News: The Presentation of the Congo, Cuba and Cyprus Crises in Four Norwegian Newspapers', *Journal of Peace Research*, 2, 1 (1965) 64–91.

[138] See: Anon, 'Pilot gave warning of crash risk in using inexperienced crews "two hours before Trident take-off"', *Times*, Nov 29 1972, p. 4; and Anon, 'Trident pilot's heart trouble started when he was 20, pathologist tells crash inquiry', *Times*, Dec 6 1972, p. 3.

It was also, perhaps most importantly, unambiguous: sleeping pilots were dangerous. December 1972 was the first time BALPA had focused on sleepiness, rather than tiredness, in their discussion of pilot fatigue. The image of the sleeping pilot was less ambiguous than that of the tired pilot. BALPA's argument that tiredness caused skill decrement and could contribute to serious incidents by causing pilot error was, while supported by civil and military research, complex to communicate to the public. The safety implications of pilots unintentionally sleeping on the flight deck were, however, unambiguous. The potential result was clear and deeply frightening.

To say the sleeping flight crew story made national headlines would be an understatement. On 13 December alone over thirty local and national newspapers carried the story. It made the front page of a number of national newspapers including the *Times*, the *Daily Express*, the *Daily Mail*, and the *Telegraph*.[139] Most news stories relied heavily on BALPA's version of events, quoting extensively from interviews with Hurley. This was, no doubt, because as BALPA released the findings of the report it was in control and was able to organise a press release to explain the implications for passenger safety. This tactic ensured that BALPA's version of events was the one that dominated the reports published on 13 December. BOAC spokespersons were only able to give a short reactive press release in response to the story, and the view of airlines was engaged with less as a result. Hurley, on the other hand, was quoted at length in a number of local and national newspapers. Keen to use the opportunity to further BALPA's campaign for shorter working hours and

[139] Arthur Reed, 'Ministry Inquiry over BOAC crew asleep at controls of jet flying 30,000 ft', *Times*, Dec 13 1972, p. 1; MRC MSS.248/4/3: Douglas Thompson, 'Peril of Sleeping Pilots' *Daily Mail*, Dec 13 1972; MRC MSS.248/4/3: E. M. Donaldson, 'BOAC crew "dozed at 30,000ft"', *Telegraph*, Dec 13 1972.

more balanced rosters, his press release stated that the overall hours flown by the captain in question were not excessive. In the twenty-eight-day work periods leading up to the one in which the flight-deck crew unintentionally slept on duty, the captain had worked well within the 100-hour limit set by the Board of Trade. Hurley argued, instead, that intensive rostering had caused fatigue in the short term:

> The fatigue comes in when some BOAC pilots are rostered, for instance, on a sixteen-day round trip to the Far East, flying against the clock and zone changes.[140]

The irregularity of scheduling and a disregard for the flight crews' circadian rhythms, not the hours worked, was, according to Hurley, the problem. Intensive scheduling had, he argued, resulted in 'risk situations' in hundreds of other instances.[141]

Operators accused Hurley of hyperbole – of exaggerating both the prevalence and the dangers of pilot fatigue – but some of his contemporaries released statements of support. Reiterating his earlier argument, Tebbit came out in support of BALPA in an interview with the *Telegraph.* Unintentional periods of sleep on the flight deck were, Tebbit argued, not uncommon:

> All too many of my former colleagues have fallen asleep on the flight deck and I have done so myself … But that doesn't mean we were working too hard. It means we were working when our bodies were crying out to go to sleep. This is because of the odd hours at which

[140] Frank Robson, 'Jet-tired! Drama of pilots who dozed off at 30,000 feet', *Daily Express*, Dec 13 1972, p. 1.
[141] Mark Dowdney, 'Boeing Crew Fell Asleep in Mid-Air', *Daily Mirror*, Dec 13 1972, p. 7.

> pilots sometimes start work and because breakfast time in Hong Kong is bedtime in London.[142]

Like Hurley, Tebbit suggested that the length of working hours were not, in general, problematic. It was, he suggested, the distribution of hours and the effect of time zone changes that caused dangerous sleep-inducing fatigue.

As a result of Hurley's press release, the overwhelming majority of the news reports that appeared on 13 December 1972 reframed fatigue in its most frightening manifestation – as sleep – and focused on the potential risk pilot fatigue posed to passenger safety. Some local newspapers, such as the *Dundee Evening Telegraph* proposed that fatigue might explain 'some recent air disasters'.[143] Others called for an immediate government inquiry into the matter to ensure the protection of the travelling public. Frank Robson, reporter for the *Daily Express*, was particularly adamant that the impact of schedules be investigated:

> Lord Boyd-Carpenter! Here is a pressing task for you, as chief of the newly constituted Civil Aviation Authority. Order an immediate inquiry into aircrew schedules. And change them if necessary.[144]

The initial reports that appeared on 13 December 1972 tended to fall on the side of pilots, situating the responsibility for safety with regulatory bodies. A report in the *Gloucester Citizen* concluded that, given the potential for

[142] MRC MSS.248/4/3: E. M. Donaldson, 'BOAC crew "dozed at 30,000ft"', *Telegraph*, Dec 13 1972.
[143] MRC MSS.248/4/3: Anon, "Dropping Off", *Dundee Evening Telegraph*, Dec 13 1972.
[144] Frank Robson, 'Jet-tired! Drama of pilots who dozed off at 30,000 feet', *Daily Express*, Dec 13 1972, p. 1.

'hideous loss of life' in air disasters, it was 'reassuring that the pilots themselves … [were] campaigning for improvements'.[145] At this point then, the story seemed to be a public relations success for BALPA. It had catapulted pilot health and working hours into the public arena and most initial reports were overtly sympathetic to the pilots' cause.

Most of the journalists who covered the story initially were air or transport correspondents. Arthur Reed of the *Times* was an air correspondent, as were Edward Mortlock Donaldson of the *Daily Telegraph*, Michael Donne of the *Financial Times*, Keith Thompson and Frank Robson of the *Daily Express*, and Angus McPherson of the *Daily Mail*. Others covered stories related to travel, transport, and defence. David Fairhall of the *Guardian* covered issues relating to national defence and maritime services, while Harvey Elliot of the *Daily Mail* wrote on travel and transport generally. The only high-profile journalist to cover the story who was drawn from more mainstream journalism was business correspondent Michael Cassell of the *Financial Times*. Most of the journalists covering the story did not, therefore, necessarily have much experience reporting issues relating to occupational health and safety, medicine, or employment. For example, in Reed's term at the *Times* between 1967 and 1981, he wrote mainly on airports, technical developments, and occasionally on industrial action. Other air correspondents were experienced pilots. Some, such as Donaldson, had served in the RAF during the Second World War. For these reasons, many air correspondents presented a largely sympathetic account of the story. They tended to privilege

[145] MRC MSS.248/4/3: Anon, 'The perils of pilot fatigue', *Gloucester Citizen*, Dec 13 1972.

BALPA's point of view, and often included extended quotations from interviews with pilots.[146]

Air correspondents were critical of airline management. Some adopted the sceptical and probing style of investigative journalism. Donaldson, perhaps the air correspondent with the most extensive personal experience of flight, alluded to an industry cover-up of the dangers of fatigue. In an article published on 14 December 1972, Donaldson argued that a report produced by BOAC's director of medical services, Frank Preston, in 1966 'had been kept secret'. The article contained a number of verbatim quotes from pilots, including the following from a BOAC pilot: 'We were told that it was industrial dynamite and that it had been stopped at board level. We never knew what it contained.'[147] In line with pilot testimonies, Donaldson argued that BOAC management had knowingly placed workers and passengers in potentially dangerous situations by covering up the 1966 report.

In an article published in the *Sunday Observer* a few days later, Tebbit also alluded to potential misconduct, specifically collusion between Harold Wilson's 1964-1970 Labour government and national carriers BEA and BOAC, which were state owned in this period.[148] The daily limit on pilot working hours – sixteen hours – had been vociferously condemned by crews in 1966, but after 'consultations' with airlines, government ministers approved limits that they had earlier proposed be drastically reduced.[149] Adopting the

[146] See for example, MRC MSS.248/4/3: E. M. Donaldson, 'Dozing Pilots Inquiry Begun by Minister', *Telegraph*, Dec 14 1972.
[147] MRC MSS.248/4/3: E. M. Donaldson, 'Dozing Pilots Inquiry Begun by Minister', *Telegraph*, Dec 14 1972.
[148] BEA and BOAC merged in 1974, to form British Airways (BA). BA was then privatised in 1987 by the Conservative government.
[149] MRC MSS.248/4/3: Norman Tebbit, 'Air crashes that could be avoided', *Sunday Observer*, Dec 17 1972.

tone and linguistic style of investigative journalists, Tebbit's use of language indicated a degree of scepticism here and suggested that the entanglement of airlines with the British government, and as such industry regulators, may have allowed concerns about safety to be side-lined in favour of financial gain in this instance.

In the immediate aftermath of BALPA's exposé a number of air correspondents emphasised the hectic work schedules of pilots. Thompson suggested in the *Daily Express* that the fast-paced nature of civil aviation, particularly the trend for turn-arounds as short as thirty minutes, might be a safety issue.[150] Others suggested that the pressures under which airline pilots worked eroded morale and affected pilot-management relations. Donne called, in the *Financial Times*, for this to be investigated closely.[151] Some journalists even went so far as to suggest that poor management was the primary cause of pilot stress. In a *Daily Mail* article critical of airline management, Elliot suggested that:

> One of the main ways of overcoming fatigue is to improve morale … On the other hand, cost-conscious managements have been too detached, as a result of which they have displayed lamentable ignorance of the real problems involved while pontificating from their homes in Weybridge or Woking.[152]

[150] Keith Thompson, 'The letter of fear signed by 46 pilots', *Daily Express*, Dec 14 1972, p. 10.
[151] MRC MSS.248/4/3: Michael Donne, 'The pressure under which airline pilots work', *Financial Times*, Dec 15 1972.
[152] MRC MSS.248/4/3: Harvey Elliott, 'Airline bosses are rapped', *Daily Mail*, Dec 15 1972.

BOAC management – absent and out-of-touch with the rank and file – were, according to this narrative, primarily responsible for 'stress and fatigue among airline pilots'.[153]

Elliott focused at length on testimony provided by BOAC's former director of medical services, Kenneth Bergin. In November 1972 Bergin delivered a paper at BALPA's Technical Symposium 'Outlook on Safety'. Focused, generally, on the problem of human fallibility in airline flying, the symposium covered a number of areas including error, ergonomics, standardisation, and regulation. Bergin's paper focused on the effects of fatigue on flight safety. In his paper Bergin argued that the problem of fatigue had not yet been remedied because, as David Wooley put it in the conference proceedings published in aviation weekly *Flight International*, of the:

> Prima donna attitude of some pilots alongside the excessive detachment of some managers, and … too much timidity in some of the medical officers who were placed between the two sides and in a position to improve communications.[154]

As in earlier Flying Personnel Research Committee (FPRC) studies, Bergin argued that medical officers were crucial in the negotiation of working practices and management of fatigue. They occupied, as Charles Symonds (1890-1978) and Denis J. Williams suggested in 1942, a unique social position in airlines and had, thus, a responsibility to mediate between flight deck crew and managers.[155]

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[153] Ibid.
[154] David Wooley, 'Outlook on Safety', *Flight International*, Nov 23 1972, 737-739, p. 738.
[155] TNA AIR 57/8: C. P. Symonds and Denis Williams, 'FPRC Report 412(e): Investigation of Psychological Disorders in Flying Personnel: Personal Investigation in Fighter Command',

In the immediate days and weeks following the conference Bergin's paper was only discussed in specialist aviation publications, such as *Flight International*. After the release of the sleeping flight crew story, however, it was widely referred to in the mainstream media. In his article for the *Daily Mail,* which focused particularly on the former medical director's assessment of management and leadership, Elliott included several extended quotations from Bergin's paper, including the following:

> There is a marked lack of leaders in industry who really understand the psychology of leadership and there have been some lamentable examples in airlines in recent years … It is almost unbelievable if one observes the reactions of a group of people who are well led, well-motivated and morale is high and compare the same group under identical circumstances when badly led and with poor morale … It is my duty to point out … that where this internecine strife is going on erosion and corrosion of confidence will exist. And that, in its turn, will produce a complex train of psychological problems which are stressful to all concerned and in the case of pilots may be dangerous.[156]

Bergin argued that airline managements tended to overlook issues relating to pilot fatigue because of their preoccupation with profit. A number of air correspondents and contemporary commentators focused on this issue in the days, weeks, and months following the release of the sleeping flight crew story. Tebbit, for example, was critical of the lack of airline spending on human factors in aviation. While 'enormous sums' were spent on the design of

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August 1942; TNA AIR 57/8: C. P. Symonds and Denis Williams, 'FPRC Report 412(f): Investigation of Psychological Disorders in Flying Personnel: Personal Investigation in Bomber Command', August 1942.

[156] MRC MSS.248/4/3: Harvey Elliott, 'Airline bosses are rapped', *Daily Mail*, Dec 15 1972.

aircraft to 'build in' safety, he argued, comparatively little was spent on the promotion of pilot comfort and health, an 'absurd' state of affairs according to Tebbit.[157] Saving money on issues relating to safety, including the payment of staff, was, Tebbit argued in an article published in the *Sunday Observer*, an ultimately misinformed move by airlines as negative press relating to accidents and other near misses – such as the sleeping flight crew story – would likely deter passengers from flying and thus effect turnover and, ultimately, profit.

Fatigue and its causes, however, were not uncontested, even among pilots. Those sceptical about the sleeping flight crew exposé sought to challenge and undermine the sympathetic narrative presented by air correspondents and former pilots, such as Tebbit. These more critical accounts tended to be produced by transport reporters, who focused on industries other than aviation. A number of particularly critical pieces, including one printed in the *Guardian* on 14 December 1972, were published anonymously.[158] Such commentaries repeatedly made three claims: that pilots overstated their workload, that pilots and unions were more interested in pay than safety, and that the responsibility for the avoidance of fatigue lay with pilots. Regarding workload, a number of commentators suggested that, as the pay and working hours of pilots compared favourably with other occupational groups, they were not in a position to complain about workplace fatigue. As Fairhall noted in an article for the *Guardian*:

[157] MRC MSS.248/4/3: Norman Tebbit, 'Air crashes that could be avoided', *Sunday Observer*, Dec 17 1972.
[158] MRC MSS.248/4/3: See Anon, 'Capten, art tha sleepin' there above?', *Guardian*, Dec 14 1972.

> The fact is pilots work short hours for a lot of money … surely the least we can expect of their sense of duty is that they keep themselves awake, however tired they may be.[159]

An article published in the *Guardian* anonymously on the same date echoed these sentiments. It suggested that the working hours of pilots were not 'unbearably taxing' given the other privileges of the job: a 'five-figure salary … and long rest periods'.[160]

A number of retired airline pilots echoed these sentiments in letters written to newspaper editors. Many of these argued, in line with broader arguments about the effects of automation, that use of automatic pilot made work physically easier and reduced fatigue. As Sarah Hayes and Alison Haggett have shown, this stance was not universally adopted. in the middle and late twentieth century a number of medical bodies, including the World Health Organisation, argued that automation had a number of unintended consequences, including potential psychological costs.[161] This nuance was not, however, represented in the pages of British newspapers. The letters published by British broadsheets argued, simply, that automation had so simplified the work of airline pilots that in-flight sleep was induced by boredom. As retired pilot W. D. Williams put it in a letter to the editor of the *Telegraph*: 'is this not a case of sitting in a comfortable chair in front of a desk with so little to do that one is overtaken by drowsiness?'[162]

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[159] MRC MSS.248/4/3: David Fairhall, 'Dream Flights', *Guardian,* Dec 14 1972.
[160] MRC MSS.248/4/3: Anon, 'Capten, art tha sleepin' there above?', *Guardian*, Dec 14 1972.
[161] Sarah Hayes, 'Industrial Automation and Stress, c. 1945-79' in Mark Jackson (ed.), *Stress in Post-War Britain, 1945-85*, (London: Pickering and Chatto, 2015), pp. 75-94; Alison Haggett, *A History of Male Psychological Disorders in Britain, 1945-1980*, (Basingstoke: Palgrave Macmillan, 2015).
[162] MRC MSS.248/4/3: W. D. Williams, 'Little to do?', *Telegraph*, Dec 20 1972.

A number of journalists suggested that pilots and unions were more concerned with pay than safety. An article published anonymously in the *Guardian* on 14 December 1972, for example, suggested that BALPA was using a 'scare story' as a public 'weapon against BOAC' in the hope that such public disclosures would 'frighten away passengers' unless the airline was 'seen to act in the pilots' favour'.[163] The article argued that the release of the sleeping flight crew story was part of a public relations strategy, as chairman of BALPA, Laurie Taylor, was a member of the recently-established Bader Committee, 'so it was likely that the committee would soon have been aware of BALPA's own pieces of evidence'.[164] The suggestion, then, was that the disclosure was an intentional act on the part of BALPA to influence corporation policy through the media before the outcome of the Bader Committee.

This contention was echoed by a number of former airline pilots in letters published in national newspapers. Retired airline pilot William Sheperd expressed his disapproval of the exposé in a letter to the editor of the *Times* on 15 December 1972:

> That BALPA should have produced a scare about tired pilots will surprise few of us … These dubious ploys are regularly rehearsed as preludes to demands for inordinate pay increases.[165]

The release of the sleeping flight crew story was, according to Sheperd, part of an intentional, and historic, industrial bargaining strategy.

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[163] MRC MSS.248/4/3: Anon, 'Capten, art tha sleepin' there above?', *Guardian*, Dec 14 1972.
[164] Ibid.
[165] William Sheperd, 'Pilots' Hours of Work and Rest', *Times*, Dec 15 1972, p. 15.

The final, and perhaps most serious, criticism levelled against pilots following the release of the sleeping flight crew story related to crew misbehaviour and irresponsibility. Several articles suggested that responsibility for the avoidance of fatigue lay primarily with flight crew. The implication was that if flight deck and cabin crew experienced fatigue in the air, this was a result of individual, rather than structural, failings. A number of publications raised suspicions of 'eve-of-flight nightclubbing'.[166] Philip Jordan of the *Daily Mail* suggested that pilots' coping mechanisms were inappropriate. For rest, the prescription was: 'Drink beer, take drugs or sleep with the stewardess'.[167] Two former airline pilots called for an investigation into how crew members utilised rest periods for this reason.[168] Reporting of this kind continued for the rest of the month. By 1973 even some previously sympathetic air correspondents, such as the *Telegraph*'s Donaldson, suggested that pilots sometimes attended 'parties instead of going to bed at their journey's end'.[169]

By 1973 it had become clear to BALPA's senior management that the sleeping flight crew exposé had not had the desired effect. It had not led to the introduction of new flight time limitations, and journalists were beginning to publish commentaries, in line with broader media coverage of unions in the 1970s, that BALPA and the workers the Association represented were self-

[166] MRC MSS.248/4/3: Anon, 'Capten, art tha sleepin' there above?', *Guardian*, Dec 14 1972.
[167] MRC MSS.248/4/3: Philip Jordan, 'The high jinks of top-flight pilots', *Daily Mail*, Dec 14 1972.
[168] William Sheperd, 'Pilots' Hours of Work and Rest', *Times*, Dec 15 1972, p. 15; Anthony Cavendish, 'Pilots' Hours of Work and Rest', *Times*, Dec 15 1972, p. 15.
[169] MRC MSS.248/4/3: E. M. Donaldson, 'Cut likely in pilot flying time after fatigue report', *Telegraph*, Apr 9 1973.

interested and irresponsible. The contentious nature, and apparent failure, of BALPA's new approach is evident also in the fate of its Flight Fatigue Report.

The Flight Fatigue Report

In 1972 BALPA established a Flight Fatigue Committee to investigate the severity and prevalence of fatigue in commercial aviation. The Committee defined fatigue in broad functional terms, as 'that degree of tiredness which leads to impaired ability to fly accurately and make correct decisions'.[170] BALPA's Flight Fatigue Committee, thus, sought to underline the close relationship between pilot fatigue, error, and accidents. As Bridget M. Hutter and Sally Lloyd Bostock have suggested, accidents have an emotive power. Strong emotions are roused by news of serious injury or tragic death, especially when there are large numbers of victims. The power of accidents to command attention and stimulate emotions in turn has social consequences. Accidents create expectations and demands for action. Not only must some response be made, it must be seen to be made. A concrete instance of harm brings home the realities of risk in a way that abstract information in the form of probabilities and risk assessments cannot do.[171] BALPA's Flight Fatigue Committee sought to exploit the emotional power of accidents. As such, it focused primarily on the relationship between fatigue and air crashes. The Committee re-investigated ten accidents that took place between 1967 and 1970, in which pilot error was identified. Although none of the original accident reports cited fatigue as a causal factor, BALPA suggested that fatigue had

[170] MRC MSS.248/4/2, BALPA, 'Flight Fatigue: Report of the Special Committee', p. 1.
[171] Bridget M. Hutter and Sally Lloyd-Bostock, 'The Power of Accidents: The Social and Psychological Impact of Accidents and the Enforcement of Safety Regulations', *The British Journal of Criminology*, 30, 4 (1990) 409-422.

compounded the difficulties of all pilots involved and should be considered a primary cause in six of the ten accidents.[172]

On 19 February 1973 BALPA presented the Bader Committee with a preliminary version of the Flight Fatigue Report. In a 1973 article, *Industrial Management* analysed the events leading up the publication of the Bader Committee report. BALPA, the article suggested, had not carried out proceedings professionally. The Association, according to the article, went to the Bader Committee to make their recommendations 'displaying the attitude, "If you don't do what we want we'll get things changed sooner or later anyway"'.[173] This, the article suggested, was perhaps not the 'wisest' method of presenting suggestions concerning a 'highly volatile issue' to an 'independent, objective body'.[174] Possibly as a result of BALPA's 'naivety and sheer blundering', as *Industrial Management* put it, the Bader Committee did not accept BALPA's contention that past accidents had been caused by fatigue.[175] The Committee, in fact, excluded all discussion of accidents from it's final report, published in June 1973. 'On the evidence we received', the Bader Committee concluded, 'we were unable to decide whether fatigue had caused any accident to a United Kingdom registered aircraft in recent years'. 'The absence of vital information in many accident reports', the Committee continued, 'prevented us from making deductions based on accident information.'[176]

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[172] BALPA were not the first to attempt to produce a report on the relationship between pilot fatigue and accidents. In 1961 the Air Ministry began research for a report on the subject, see: TNA AIR 2/14723: Letter from A. B. Goorney to Air Ministry, 10 July 1961.
[173] Anon, 'Airlines stall on pilot demands', *Industrial Management*, 73, 7/8 (1973) 38-41, p. 40.
[174] Ibid. p. 40.
[175] Ibid. p. 40.
[176] TNA DR/13/4: Bader, 'Report of the Committee on Flight Time Limitations', p. 14.

The cavalier style employed by BALPA at the meeting with the Bader Committee speaks volumes of the Association's overall approach to industrial bargaining. BALPA representatives did not consider themselves trade unionists in the traditional sense, but high-status professionals with a wealth of personal and organisational experience. Although BALPA was formally associated with the TUC throughout the 1960s and 1970s, it rarely adhered to TUC policy, particularly with regards to industrial negotiations. Negotiations were carried out 'not by professional negotiators', as per TUC policy, but by members of the Association. These elected representatives were, according to *Industrial Management*, often 'poor negotiators'.[177] They lacked formal training and had, at most, two years' experience. The Association's lack of, as Blain put it in 1972, 'competent professional guidance in the field of trade union representation', caused serious difficulties during negotiations.[178] Operators cited this as a primary cause of disputes between management and pilots.[179]

The situation was not improved by BALPA's capricious public relations policy. On 5 April 1973 BALPA sent the completed Flight Fatigue Report to fifty parliamentarians deemed to have a 'special interest in aviation'.[180] These members of parliament, the Association trusted, 'would be BALPA's strongest allies'.[181] It was hoped that, if convinced by the Flight Fatigue Report, these parliamentarians would advocate for stricter regulation of flight and duty times. In a covering letter BALPA's chairman, E. S. Linstead, asked that recipients

[177] Anon, 'Airlines stall on pilot demands', 40.
[178] Blain, *Pilots and Management,* p. 75.
[179] Ibid.
[180] MRC MSS.248/4/2: Letter from E. S. Linstead to fifty members of parliament, 5 April 1973.
[181] MRC MSS.248/4/2: Minutes of the Meeting of the Special Committee of the National Executive Council on Flight Fatigue, 9 March 1973, p. 5.

treat the report 'as confidential from the general public and press'.[182] Unsurprisingly though, given its wide distribution, the report was released to the press a few days later. It seems, from Flight Fatigue Committee meeting minutes, that this was Linstead's intention:

> Mr [Omar] Malik [chairman of BALPA's Flight Fatigue Committee] pointed out that since the BALPA Report had been available for nearly a month, each week that elapsed increased the danger of it being 'leaked' to the Press. Captain Linstead said that in some ways this would be an advantage.[183]

Details of the report were published widely in the mainstream media, much to the dismay of airline operators. Senior executives within the airline industry deemed the report intentionally 'alarmist', and many were incensed that that they had not been given sight of it in advance.[184] Group managing director of the British Airways Board, H. E. Marking, was particularly critical of BALPA's decision to distribute the report given their agreement, on 15 December 1972 'that neither side would make any statement which was inflammatory' and likely to damage airline-union relations.[185] In a letter to Linstead written shortly after the 'leak', Marking suggested that the distribution of the report to parliamentarians 'was in effect inviting a leak':

> I read that this came about as the result of an unofficial disclosure and not as a release by BALPA, but with the wide distribution which, so I

[182] MRC MSS.248/4/2: Letter from E. S. Linstead to fifty members of parliament, 5 April 1973.
[183] MRC MSS.248/4/2: Minutes of the Meeting of the Special Committee of the National Executive Council on Flight Fatigue, 9 March 1973, p. 5.
[184] Tim Reed, 'Call to reduce pilots' hours of work expected', *Times*, Apr 9 1973, p. 1.
[185] MRC MSS.248/4/2: Letter from H. E. Marking to E. S. Linstead, 11 April 1973.

> understand, was given to the report it was, I suggest, not reasonable to think that a leak would not occur. As we all know, if something is to be kept confidential it must be restricted to a very small number of persons, and that is why I regret so much that BALPA gave this submission such an unnecessarily wide distribution.[186]

The managing director of British Airways, J. M. Sauvage, was also critical of, what he termed, 'BALPA's PR activities'. In a letter to Linstead on 12 April 1973, he urged BALPA not to 'involve Britannia' in future 'PR efforts'.[187]

Senior members of BALPA were also critical of the report's wide circulation prior to its publication in the national press. Taylor, BALPA's former chairman, argued that the Association should have kept the report private until the Bader inquiry was complete. As the *Daily Mail* reported on 9 April 1973, this created tensions within the Association:

> Publication of the BALPA memorandum at this stage has already caused a row. The former chairman of BALPA, Captain Laurie Taylor – co-opted on to the Bader committee – tried to get the pilots to keep the report private until the whole Bader inquiry was over. It is an obvious attempt to influence findings of the official inquiry.[188]

Tensions within the Association persisted for several months. A few days after the publication of the Flight Fatigue Report, Linstead wrote to all parliamentary members who had received a copy of the preliminary report, asking that it be returned to BALPA. The Association received surprised and

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[186] Ibid.
[187] MRC MSS.248/4/2: Letter from J. M. Sauvage to E. S. Linstead, 12 April 1973.
[188] MRC MSS.248/4/3: Angus Macpherson, '"Tired-out" pilots call for cut in flying hours', *Daily Mail*, Apr 9 1973.

sometimes sarcastic responses from members. I. Chancellor, for example, suggested that recalling the reports after their wide publication was 'akin to bolting the stable door after the horse has gone'.[189] It is unclear whether this seemingly blundering approach to public relations was intentional or not. Was it merely a ruse? An attempt to make the report's wide dissemination appear unintentional, just as much of a shock and disappointment to BALPA as it was to the airline operators? Or does it, perhaps, reveal the divisions within the Association? It seems, from the internal communications between senior BALPA members, that both interpretations hold. Some members of the Association, such as Linstead, were in favour of the report's disclosure and facilitated this. Others, including Taylor and Malik, saw things differently. BALPA's uncoordinated approach to public relations was, then, reflective of divisions within the Association. Given the disagreement between members at the highest level of the Association, a cohesive public relations strategy was out of the question.

As a result of continued tensions and disagreements, BALPA's Flight Fatigue Committee was disbanded in May 1973, before the official publication of the Flight Fatigue Report. The Committee expressed 'unanimous concern' that the problem of pilot fatigue was now to be left 'in vacuu'. The Committee's members agreed, in a final meeting on 7 May 1973, that 'all changes influencing the new regulations by pressure of pilot opinion would be lost'.[190] The Committee was right to be concerned. Just over a month after the Flight Fatigue Committee was disbanded senior members of BALPA decided, partly

[189] MRC MSS.248/4/2: Letter from I. Chancellor to BALPA, 24 April 1973.
[190] MRC MSS.248/4/2: Minutes of the Final Meeting of the Special Committee of the National Executive Council on Flight Fatigue, 7 May 1973, p. 2.

in response to legal advice, not to publish the Flight Fatigue Report. It was felt that with the issue of the Bader Committee's report:

> There was no longer any urgency in revising the Flight Fatigue Committee Report for open publication and that the first priority of the Association was now the compiling of its official response to the Bader report.[191]

After almost two years of concerted effort by the Flight Fatigue Committee, and a determined, though contentious, public relations effort, BALPA ceded complete control to industry regulators.

Conclusion: Not Safe, Not Fair

In June 1973 the Bader Committee published its final report. The Committee made a number of recommendations about flight time limitations and rest periods, as outlined in Chapter Three, but one of its major conclusions focused on industrial bargaining. The Committee argued that the agreements reached between airlines and unions in the 1960s had intensified pilot workload. Pay and productivity agreements, the Committee concluded, had 'increased rather than reduced the possibility of fatigue'.[192] As a result, the Bader Committee concluded that the control of pilot working hours and fatigue prevention 'should not be a part of the industrial bargaining process'.[193] BALPA could, therefore, no longer exploit the ambiguous nature of fatigue to campaign for social, financial, and safety objectives simultaneously. After

[191] MRC MSS.248/4/2: BALPA Memorandum, 'Bader Committee Report and Flight Fatigue Committee Report', 22 June 1973.
[192] TNA DR/13/4: Bader, 'Report of the Committee on Flight Time Limitations', p. 12.
[193] Ibid. p. 12.

1973 BALPA rarely referred to fatigue in industrial negotiations. When the Association did raise the issue of fatigue with airline operators and the Civil Aviation Authority (CAA) – in 1987 under the auspices of the Confidential Human Factors Incident Reporting Programme (CHIRP), and 1992, following the release of the Joint Aviation Authorities' draft changes to European flight time limitations – its claims were ignored. By the early 1990s, then, the parameters for negotiating on matters of flight time limitations had been reset: fatigue was no longer a factor that held any weight on the negotiating table.

In other national and occupational contexts, though, fatigue continued to feature heavily in industrial bargaining. As recently as 2016, pilots based in the United Arab Emrites complained of fatigue in the British press. In July 2016 FlyDubai pilots released a raft of confidential air safety reports to the *Guardian* in much the same tone, and with much the same aims, as BALPA had in 1972.[194] Recently the BMA has taken a similar approach in response to government plans to introduce a new contract for junior doctors. Indeed, the campaign against the imposition of the new contract has been dominated by two slogans: 'not safe, not fair' and 'tired doctors make mistakes'. My assessment of BALPA here does, therefore, have broader implications.

BALPA successfully drew attention to the issue of pilot fatigue in 1972. In December of that year the sleeping flight deck story was widely reported. Following an internal dispute, however, the Association ceased its public relations campaign and ceded complete control to regulators. As the previous chapter has shown, the subsequent regulations produced in CAP 371 were

[194] Nick Hopkins, 'Airline pilots complain of dangerous fatigue in leaked documents', *Guardian* website, first published 29 July 2016, available at: https://www.theguardian.com/business/2016/jul/29/airline-pilots-complain-dangerous-fatigue-leaked-documents-flydubai [last accessed 25 August 2016].

permissive and, thus, did not completely protect pilots and other flight deck crew against intensive working practices. My intention here is not to assign blame but, rather, to reflect on the responsibilities trade unions have to workers and, in some instances, publics. Trade unions have a responsibility to protect workers by publicising grievances but also, crucially, negotiating with employers and lawmakers to ensure safe working conditions. BALPA succeeded in publicising workplace fatigue in the 1970s, but had only marginal policy impact. The BMA, if it is to succeed in protecting workers and publics against the fatigue of junior doctors will need to continue the necessary, if laboured, negotiations with the government and not, as BALPA did, completely cede control to external agencies.

Flight deck crew were central to BALPA's public relations campaign. The reasons for this were multiple, as this chapter has demonstrated, but broadly reflect a contemporary preoccupation with pilot, rather than flight attendant, fatigue. In the twentieth century, less heed was paid to the health and welfare of flight attendants, in comparison with their colleagues in the cockpit. The reasons for this are unclear. It may be that misogyny is to blame, given the proportion of women employed as cabin crew. There may, also, have been issues of status. It could, for example, be a result of the way the work of flight attendants was framed in the middle and late twentieth century. As Alan Derickson, Kathleen Barry, and others have argued, the duties of cabin crew were conceptualised as, primarily, service and emotion work.[195]

[195] Alan Derickson, *Dangerously Sleepy: Overworked Americans and the Cult of Manly Wakefulness*, (Philadelphia: University of Pennsylvania Press, 2014); Kathleen M. Barry, *Femininity in Flight: A History of Flight Attendants*, (London: Duke University Press, 2007); Lucy C. S. Budd, Morag Bell and Adam P. Warren, 'Taking Care in the Air: Jet Air Travel and Passenger Health, a Study of the British Overseas Airways Corporation (1940-1974)', *Social History of Medicine*, 25, 2 (2011) 446-461.

Though officially carried in flight for reasons of health and safety, the work of flight attendants in twentieth-century Britain was not deemed an area worthy of study or regulation until the mid-1970s. Drawing on a rich base of oral history interviews with retired flight attendants, the following chapter challenges the notion that cabin crew work was defined by interpersonal labour. It argues, instead, that fatigue featured heavily in the lived experiences of cabin attendants.

5

Fatigue, Emotional Labour, and Interpersonal Relations

On 8 January 1989, a Boeing 737-400 aircraft crashed on to the embankment of the M1 motorway near Kegworth in Leicestershire. On route from London Heathrow to Belfast, a fan-blade broke in the aircraft's left engine. As a result, the air-conditioning was disrupted and the flight deck filled with smoke. The flight deck crew believed that this indicated a fault in the aircraft's right engine, since earlier models of the Boeing 737 ventilated the flight deck from the right. They were unaware that the new 737-400 used a different system and that the left engine, not the right, was compromised. The crew mistakenly shut down the right engine. The left engine initially operated normally during the subsequent descent, which persuaded the flight deck crew that they had dealt with the emergency correctly. The crew initiated a diversion to East Midlands Airport and received radar direction from air traffic control to position the aircraft for an instrument approach to land. The flight deck crew relayed this information to passengers and cabin crew. The approach continued normally, until the left engine abruptly lost power roughly two miles from the runway. Efforts to restart the aircraft's right engine were not successful. The aircraft continued to descend and struck a field adjacent to the eastern embankment of the M1 motorway. It then passed through trees and suffered a second severe impact on the western embankment of the motorway before coming to rest on a wooded embankment approximately 900 metres from its intended

destination: runway twenty-seven at East Midlands Airport. Thirty-nine passengers died in the accident and a further eight passengers died later from their injuries. Of the other seventy-nine occupants, seventy-four suffered serious injury.

The Air Accidents Investigation Branch (AAIB) concluded, in an accident report published on 24 August 1990, that the following factors contributed to the incorrect response of the flight crew:

1. The combination of heavy engine vibration, noise, shuddering and an associated smell of fire were outside their training and experience.
2. They reacted to the initial engine problem prematurely and in a way that was contrary to their training.
3. They did not assimilate the indications on the engine instrument display before they throttled back the No 2 [right] engine.
4. As the No 2 [right] engine was throttled back, the noise and shuddering associated with the surging of the No 1 [left] engine ceased, persuading them that they had correctly identified the defective engine.
5. They were not informed of the flames which had emanated from the No 1 [left] engine and which had been observed by many on board, including 3 cabin attendants in the aft cabin.[1]

The AAIB concluded that, 'had some initiative been taken by one or more of the cabin crew who had seen the distress of the left engine', the 'accident could have been prevented'.[2] As such, the AAIB recommended that 'training exercises for pilots and cabin crew should be introduced to improve co-

[1] Air Accidents Investigation Branch, *Report on the accident to Boeing 737-400 G-OBME near Kegworth, Leicestershire on 8 January 1989*, (London: HMSO, 1990), p. 2.
[2] Ibid. p. 106.

ordination between technical and cabin crews in response to an emergency'.[3] The report argued that such training would have a two-fold benefit. It would serve, on the one hand, to provide pilots with the knowledge that cabin crew were 'a source of information that should be considered in certain emergencies'.[4] Equally, it would equip cabin crew with the technical and interpersonal skills to effectively communicate with flight deck crew in emergencies. In response to these recommendations, the Civil Aviation Authority (CAA) made annual crew resource management (CRM) training mandatory for flight deck and cabin crew.[5] This training was typically classroom-based, involving a combination of lectures, discussion and informal role-play, and included core skill modules on personal and interpersonal human factors.[6]

This chapter examines crew relations prior to the introduction of CRM training in the mid-1990s. Here I argue that, though regulatory policy focused on individual and company-centred strategies for the avoidance of fatigue, throughout the twentieth century crew-wide coping mechanisms were integral to the management of fatigue in flight. Drawing on a rich base of oral history testimonies, I argue that these, largely informal, solutions relied on good relations both within and between the flight deck and the cabin. Whereas Chapter One and Chapter Two of this thesis looked at how fatigue was constituted in industry and military settings, and Chapter Three and Chapter

[3] Ibid. p. 150.
[4] Ibid. p. 109.
[5] Annual CRM training was made mandatory for pilots in 1993 and cabin crew in 1995, see: Rhona Flin, Paul O'Connor and Kathryn Mearns, 'Crew Resource Management: Improving Team Work in High Reliability Industries', *Team Performance Management*, 8, 3/4 (2002) 68-78.
[6] Ibid.

Four explored how fatigue was configured in regulatory and trade union discourses, this chapter turns to quotidian understandings and experiences of fatigue.

Here I discuss, for the first time in detail, the experiences of cabin crew. So far, this thesis has focused primarily on flight deck crew: on flight engineers, navigators, and pilots. This focus reflects twentieth century preoccupations. For much of the century, fatigue was investigated and regulated only in instances where flight deck crew were affected. The reasons for this were complex and changed over time, but as previous chapters have shown, for much of the century the fatigue of pilots was primarily conceptualised as a barrier to flight safety. This rationale underlay many of the regulations governing pilots' hours of work and rest throughout the post-war period. The same rationale was not, however, applied to cabin crew. Though cabin crew were carried in flight for safety reasons – to evacuate passengers in case of emergency – throughout the twentieth century the fatigue of cabin crew was not deemed a threat to passenger safety.

The fatigue of pilots and other flight deck crew members was heavily researched and regulated by military and civil organisations in the twentieth century, and is thus well-represented in the archival record. This is not, however, the case for cabin crew. There are three reasons for this. Firstly, as described above, the fatigue of cabin crew was not deemed a pressing threat to passenger safety. Secondly, researchers and unions interested in the health and welfare of cabin crew tended to prioritise other issues. Given the gendered nature of cabin crew work, concerns centred on the effects of regular flight on feminine issues, such as menstruation, pregnancy, and

menopause.[7] Finally, cabin crew did not articulate their experiences in terms that regulators and researchers understood as dangerous or concerning. Their experiences were not, therefore, taken seriously. The language cabin crew used to articulate their experiences was complex. Crew members used a wide range of contemporary lay terms, including 'tiredness', 'sleepiness', 'weariness', and 'nervous exhaustion'.[8] These terms comprised the popular language of mental and physical fatigue in twentieth-century Britain. It is telling, however, that in communicating their experiences pilots and other flight deck crew rarely used popular terminology. Most, instead, used semantics specific to the aviation industry. They spoke almost exclusively of 'fatigue', and framed their narratives in line with regulatory discourse. Flight time limitations were consistently referred to. Flight deck and cabin crew understood and conceptualised how they felt differently. Though employed within the same industry, their terms of reference were different. While cabin crew drew on a broader popular vernacular, pilots engaged with expert discourses.

Given the scarcity of published and archival material available in relation to cabin crew fatigue, this chapter relies more heavily on oral testimonies than the others in this thesis. Examination of these testimonies suggests that, though contemporary concern with cabin crew fatigue – at least according to the official record – was slight, fatigue was prominent in the lived

[7] R. G. Cameron, 'Effect of flying on the menstrual function of air hostesses', *Aerospace Medicine*, 40, 9 (1969) 1020-1023; R. G. Cameron, 'Should Air Hostesses Continue Flight Duty During the First Trimester of Pregnancy?', *Aerospace Medicine*, 44, 5 (1973) 552-556; Roberta Lessor, 'Consciousness of Time and Time for the Development of Consciousness: Health Awareness Among Women Flight Attendants', *Sociology of Health and Illness*, 7, 2 (1985) 191-213.

[8] Jill Kirby, 'Working Too Hard: Experiences of Worry and Stress in Post-War Britain' in Mark Jackson (ed.), *Stress in Post-War Britain, 1945-85*, (London: Pickering and Chatto, 2015), pp. 59-74.

experience of cabin attendants. This chapter is structured in two parts. The first examines Arlie Russell Hochschild's thesis about emotional labour, as performed by cabin crew.[9] It shows that, while for some crew members the management of emotions was a crucial part of the job, Hochschild's focus on emotions does not accurately reflect either contemporary British research on the health and wellbeing of cabin crew, or the lived experience of many crew members. In Britain both crew members and researchers tended to frame their discussion of cabin crew health in physiological terms. Rather than emotional labour, research studies and oral testimonies focused on physical factors, such as circadian dysrhythmia and manual labour. The second part of this chapter examines how relations between pilots, flight attendants, and airline executives had implications for fatigue, rest, and working hours. Extending the remit of this thesis beyond structural and person-centred narratives, it is argued that effective management of fatigue in both the flight deck and the cabin relied as much on social relations between crew members as it did on adherence to flight time limitations.

Historicising Hochschild: Service Work and Emotional Labour

Today the history of emotions is a distinctive sub-field, often connecting histories of gender, health, and psychiatry.[10] Historians are also increasingly exploring the role of emotions in the workplace, with a particular focus on

[9] Arlie Russell Hochschild, *The Managed Heart: Commercialization of Human Feeling*, second edition, (London: University of California Press, 2003).
[10] See for instance, Thomas Dixon's work on weeping and masculinity, Rhodri Hayward's on emotions and psychotherapy, and Anne Harrington's research on mother love and mental illness: Thomas Dixon, *Weeping Britiannia: Portrait of a Nation in Tears*, (Oxford: Oxford University Press, 2015); Rhodri Hayward, 'Enduring Emotions: James L. Halliday and the Invention of the Psychosocial', *Isis*, 100, 4 (2009) 827-838; Anne Harrington, 'Mother Love and Mental Illness: An Emotional History', *Osiris*, 31, 1 (2016) 94-115.

emotional labour and service work. In a recent article published in *Women's History Review,* Claire Langhamer examined women's feelings about paid work, the impact of paid employment on emotional wellbeing, and the management of feelings in the workplace in the long 1950s. Drawing explicitly on the work of Hochschild, Langhamer's article sought to historicise two related sociological concepts: emotional labour and emotional burden.[11] Prior to this, though these concepts were widely discussed within the sociology of work, few historians had explored them in any detail.[12]

Hochschild's *The Managed Heart*, first published in 1983, presents a sociological thesis about organisational emotion. Her argument, though complex, rests on a single ontological issue: the distinction between emotion work and emotional labour. For Hochschild, emotion work describes the process of managing and presenting emotions in the private sphere among, for example, family and friends. Emotional labour, on the other hand, describes the management of feelings in public spaces, such as the workplace. This labour, according to Hochschild, 'requires one to induce or suppress feeling in order to sustain the outward countenance that produces the proper state of mind in others'.[13] In other words, in jobs where certain facial and bodily displays are expected of workers, emotional labour may be

[11] Claire Langhamer, 'Feelings, Women and Work in the Long 1950s', *Women's History Review*, 26, 1 (2017) 77-92.
[12] For sociological works that have engaged with and contested this concept, see: Sharon C. Bolton and Carol Boyd, 'Trolley Dolley or Skilled Emotion Manager? Moving on from Hochschild's Managed Heart', *Work, Employment, and Society*, 17, 2 (2003) 289-308; Paul Brook, 'In Critical Defence of "Emotional Labour": Refuting Bolton's Critique of Hochschild's Concept', *Work, Employment and Society*, 23, 3 (2009) 531-548; Drew Whitelegg's article on the dialectics of emotional labour in the airline industry is a notable exception, see: Drew Whitelegg, 'Cabin Pressure: The Dialectics of Emotional Labour in the Airline Industry', *The Journal of Transport History*, 23, 1 (2002) 73-86.
[13] Hochschild, *The Managed Heart*, p. 7.

required to achieve this.[14] In some instances this may include the disguising of 'fatigue and irritation', in others it may include a gentle intonation or a friendly smile.[15] This form of labour is, according to Hochschild, particularly prevalent in workplaces where interaction with the public is required as standard: in service work, religious ministry, teaching, and also the transport industry.

According to Hochschild's thesis, emotional labour can be performed in two different ways, surface acting and deep acting. In the former, workers act out their role obligations without fully subscribing to the norms set by their employer. Their performance may seem convincing to employers and customers, but the worker retains a sense of self that is separate to that on display. Deep acting, however, refers to the internalisation of the feelings that workers are required to display. According to Hochschild many emotional labourers engage in deep acting either by changing what they feel or changing what they feign in an attempt to both enhance the quality of the emotional display and to diminish the likelihood of emotional dissonance and burnout. This is because surface acting can be fatiguing while deep acting requires less conscious effort on the part of the worker. For workers new to public-facing jobs, the emotional dissonance created by surface-acting can be particularly tiring. As one World Airways worker Hochschild interviewed explained:

> Sometimes I come off a long trip in a state of utter exhaustion, but I find I can't relax. I giggle a lot, I chatter, I call friends. It's as if I can't release

[14] Ibid.
[15] Ibid. p. 8.

> myself from an artificially created elation that kept me 'up' on the trip. I hope to be able to come down from it better as I get better at the job.[16]

In some ways then, Hochschild's theory of emotional labour shows similarities with interwar theories of flying stress, which framed fatigue as the result of psychological or emotional disturbance. Emotions, according to both theories, have the power to cause physical symptoms.[17]

The Managed Heart focused on workers from two public-facing professions in America, both of which required the 'face-to-face delivery of service': flight attendants and debt collectors.[18] Though Hochschild focused entirely on America, and the flight attendants she interviewed were drawn solely from American airlines, her thesis has been widely applied.[19] As a result of Hochschild's publication, emotional labour has become so widely associated with cabin crew work that it is often the primary case study employed by researchers investigating the management of feelings at work in the modern world. Though social scientists broadly accept that emotional labour is pertinent to the work of cabin crews today, little historical work has examined whether this also held true in the past.[20] What follows here aims to historicise Hochschild's thesis. With a specific focus on cabin crew working for British airlines in the post-war period, I examine the place of emotions within

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[16] Ibid. p. 4.
[17] Caitriona Curley and Tony Royle 'The degradation of work and the end of the skilled emotion worker at Aer Lingus: is it all trolley dollies now?', *Work, Employment and Society*, 27, 1 (2013) 105-121.
[18] Hochschild, *The Managed Heart*, p. 8.
[19] For example see: Curley and Royle 'The degradation of work and the end of the skilled emotion worker at Aer Lingus'; Claire Williams, 'Sky Service: The Demands of Emotional Labour in the Airline Industry', *Gender, Work and Organization*, 10, 5 (2003) 513-550; Joan Sangster and Julia Smith, 'Beards and Bloomers: Flight Attendants, Grievances and Embodied Labour in the Canadian Airline Industry, 1960s-1980s', *Gender, Work and Organization*, 23, 2 (2016) 183-199.
[20] See: Whitelegg, 'Cabin Pressure'; Sangster and Smith, 'Beards and Bloomers'.

broader discourses of cabin crew health and fatigue. In doing so, I tease out both how cabin crew conceptualised – in terms of causes and effects – and experienced fatigue.

Passenger-Crew Relations and Emotional Labour

Historically cabin crew were carried in flight primarily for reasons of health and safety. Indeed, British airlines only hired trained nurses as crew prior to World War Two. In the post-war period, however, the role of cabin crew in Britain changed. As Frank Jackson has noted of the British Overseas Airways Corporation (BOAC), between the 1940s and 1960s cabin crew were rebranded as in-flight attendants with an emphasis on the service and comfort of passengers.[21] As Lucy Budd, Morag Bell, and Adam P. Warren have shown though, cabin crew continued to play an important role in passenger healthcare throughout the century. They were trained to recognise and respond to outbreaks of infection, administer painkillers, and were able to give supplementary oxygen to passengers if necessary.[22]

Drew Whitelegg has shown, however, that the service side of the role was emphasised by airlines.[23] By the early 1960s, cabin crew duties involved the service of food and drink, the sale of duty-free goods, and the care and entertainment of passengers. Conversation with passengers formed a crucial part of this. As Rose Green, a flight attendant who worked for BOAC between 1970 and 1980, noted: 'You were really encouraged to talk to passengers.

[21] Frank Jackson, 'The New Air Age: BOAC and Design Policy', *Journal of Design History*, 4, 3 (1991) 167-185.
[22] Lucy C. S. Budd, Morag Bell and Adam P. Warren, 'Taking Care in the Air: Jet Air Travel and Passenger Health, a Study of the British Overseas Airways Corporation (1940-1974)', *Social History of Medicine*, 25, 2 (2011) 446-461.
[23] Whitelegg, 'Cabin Pressure'.

That was actually your main job to stand there and talk to them, wasn't it?'[24] Charles Green, who worked as a cabin attendant for BOAC between 1967 and 2005, concurred. According to his recollections, crew members would often spend the majority of their time in flight making conversation with passengers to ensure their needs were attended to: 'I mean you'd talk about seven hours say between London and New York, and when you did the return, you talked about six hours.'[25]

Some crew members found these lengthy interactions with passengers emotionally demanding. Isaac Shaw, who worked as cabin crew for both BOAC and British European Airways (BEA) between 1967 and 2003, commented that: 'of course any other interaction with other people apart from your friends who you can relax with, is going to take it out of you'.[26] Similarly Patrick Smith, who worked as a flight attendant between 1967 and 2007, noted that having to please passengers was one of the most difficult parts of working on commercial jets. Though he worked mainly for BOAC, he 'had a spate on freighters' which he described as 'wonderful, no passengers, so all I had to look after was the flight deck which suited me down to the ground'.[27] These testimonies seemingly support Hochschild's contention that emotional labour in the service of 'being nice' to passengers was widely expected of, and experienced by, cabin attendants in post-war Britain.[28]

For many, though, communication with passengers was not in and of itself a stressful endeavor. In fact, many of the men and women who were

[24] Interview with Rose Green, 21 November 2016.
[25] Interview with Charles Green, 21 November 2016.
[26] Interview with Isaac Shaw, 26 January 2017.
[27] Interview with Patrick Smith, 3 February 2017.
[28] Hochschild, *The Managed Heart*, p. 163.

employed as flight attendants by commercial airlines in the second half of the twentieth century found their work satisfying and enjoyable. Rigorous recruitment processes, and self-selection, meant that most flight attendants were temperamentally suited to the job. They were gregarious and chose to work as cabin crew, at least in part, because they enjoyed interacting with members of the public.[29] This congruence between the personal values of individual workers and the requirements of the job role meant that, when emotional labour was required of crew members in flight, it was not necessarily as difficult or exhausting as Hochschild's thesis suggests.[30] As Julia Evans, who was employed as cabin crew for a number of airlines from 1972 suggested, though work could be physically tiring it was also 'very rewarding':

> I couldn't believe how hard I was working. I've never worked so hard in my life and I've never felt so tired in my life after a night sector, but it was very very very rewarding. It was rewarding because you enjoyed looking after your passengers and you got a lot of interaction with your passengers.[31]

Hochschild's thesis – that the wants and needs of employees and companies rarely overlapped – appears, in this case, incorrect. In twentieth-century Britain it seems, rather, that airlines and flight attendants had 'common

[29] Ongoing work by Claire Langhamer suggests the same may also be true of other public-facing workers, including nurses and nuns.
[30] Recent sociological works have reached the similar conclusions, see: Curley and Royle 'The degradation of work and the end of the skilled emotion worker at Aer Lingus'; Williams, 'Sky Service'.
[31] Interview with Julia Evans, 28 November 2016.

interests'.[32] The cabin attendants interviewed for this thesis certainly spoke highly of the job.

Dutch sociologist Cas Wouters (1943-present) suggested shortly after the publication of *The Managed Heart*, that Hochschild's preoccupation with the 'costs' of emotional labour resulted in a 'one-sided and moralistic interpretation of the working conditions of flight attendants'. The 'joy' of the job was emphasised in many of the oral testimonies collected for this thesis.[33] Many former cabin attendants focused, in particular, on the novel experiences and opportunities that working in civil aviation afforded them. For many of the men and women employed as flight attendants in the post-war period, their primary reason for working as crew was, as Patrick Smith put it, 'to see the world'.[34] Indeed, a number of the former cabin attendants interviewed for this thesis warmly recalled the places that they had been and the 'great sights' that they had seen, and emphasised how 'lucky' they had been to be afforded such 'marvellous opportunities'.[35] As Julia Evans put it:

> For me it was one of the most marvellous opportunities I had ever been given in my life. All the places I had read about … suddenly I had the opportunity to go and see them.[36]

Charles Green concurred. On visiting India's Taj Mahal or New York City, he would 'pinch himself':

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[32] Cas Wouters, 'The Sociology of Emotions and Flight Attendants: Hochschild's Managed Heart', *Theory, Culture and Society*, 6 (1989) 95-123, p. 100-116, p. 100.
[33] Ibid. p. 118.
[34] Interview with Patrick Smith, 3 February 2017.
[35] Interview with Charles Green, 21 November 2016; Interview with Matthew Hart, 26 January 2017; Interview with Jacob Evans, 28 November 2016.
[36] Interview with Julia Evans, 28 November 2016.

> Three and a half hours ago I was in London and I'm walking down Fifth Avenue and someone's paying me to do it, and from somebody who started work in a factory I never lost sight of that.[37]

Class and social standing were, no doubt, important here. The men and women employed by British airlines to work as flight attendants were drawn primarily from lower-middle-class backgrounds. Many began their working lives in administrative or secretarial roles and some, like Charles Green, were employed in factories. For many, then, airline employment offered opportunities that would otherwise be unavailable. Airline work made travel and cultural engagement possible for workers. For many, this was a major benefit. Indeed, it was the primary reason most of the retired cabin attendants interviewed for this thesis sought employment in commercial aviation.

Airline work offered more, though, than travel opportunities. It allowed workers entrance into interpersonal circles that were otherwise closed to them. Prior to economic deregulation in the 1980s, flight in post-war Britain was a glamorous affair. Cabin attendants were imbued with status and allure by virtue of their association with the industry. The men and women employed as cabin attendants in post-war Britain were often invited to functions in the countries they visited. As Rose Green recalled:

> You always had to take something smart with you in case you got invited to embassies and things like that, which you did … You always had to have a long dress.[38]

[37] Interview with Charles Green, 21 November 2016.
[38] Interview with Rose Green, 21 November 2016.

Work, then, offered cabin attendants entry into new social and cultural environments at the day's end.

For those employed in the first-class cabin, novel interpersonal interactions were also central to the working day. A number of the retired cabin staff interviewed for this thesis reflected fondly on their encounters with celebrity passengers. Patrick Smith, who worked in BOAC's first-class cabin for most of his career, said that engaging with celebrity passengers was 'an absolute delight'. The Duchess of York travelled in his service a number of times and he got to know her well: 'We called her princess to start with then, "call me Fergie", so we called her Fergie and that's how you went on. You know you just treated them like a normal person'.[39]

Some crew members found these conversations with celebrity passengers invigorating. Jacob Evans, who worked in BOAC's first-class cabin throughout the 1970s, intentionally sought out interaction with celebrity passengers when he was feeling tired:

> Every aircraft you had a passenger list. Every single person was down there and the important ones were highlighted so if I was feeling really really tired and I didn't have another hour left in me, I thought I'll go and bother Sean Connery for a minute … And that got me through it. I mean that was perfect because I was enjoying my time in the aircraft, I had access to the people and no one ever turned you away. They were really really more obliging … Oh God how long have we got to go, another eleven hours. I think I'll spend half an hour with Sean Connery and he'll give me a boost, and after Sean Connery you'd look at the list and think who can I speak to next?[40]

[39] Interview with Patrick Smith, 3 February 2017.
[40] Interview with Jacob Evans, 28 November 2016.

Jacob and Julia Evans, a married couple who flew together in the 1970s, particularly enjoyed their interactions with 'people of the day'.[41] Their testimonies were peppered with anecdotes about these encounters. They recalled meeting celebrities they had 'always admired', including John Lennon, George Harrison, Joan Collins, and Shirley MacLaine.[42] Julia Evans described one encounter, with actor Peter Fonda, that brought home the unusual social position of airline work:

> I remember sitting down one evening, I was scrambling eggs for thirty-six for the breakfast service. In my galley everybody was asleep, [Jacob] was just pacing round making sure everyone was alright and this chap came and sat on the stairs … and I said, 'can I get you anything?' And he said 'no, do you mind if I talk to you?' And I said, 'that's fine'. He said, 'this is a real novelty for me … to be travelling on a commercial jet'. He said, 'my jumbo jet's in for service'. That was Peter Fonda. What do you say to somebody, you know? Here I am a kid from the sticks … mixing with these [people].[43]

Celebrity passengers were often kind and accommodating, pleased to speak with cabin attendants at length.

Crew members sometimes had difficulties managing the behavior of other passengers, however. By the mid-1980s jumbo jets, like the Boeing 747, could accommodate hundreds of passengers. The increase of seating capacity had implications for the work of cabin crew. As retired flight attendant Matthew Hart put it, 'obviously if you've got four hundred people locked up in

[41] Interview with Jacob Evans and Julia Evans, 28 November 2016.
[42] Interview with Jacob Evans, 28 November 2016.
[43] Interview with Julia Evans, 28 November 2016.

an airplane over fourteen hours you're going to get an awful lot of human issues in that time'.[44] Problems arose most often when passengers were intoxicated. These instances were emotionally trying for inexperienced crew members. Charles Green, who worked as cabin crew for BOAC, said that he only became comfortable dealing with inebriated and abusive passengers after several decades of work:

> Of course as time progresses and you get more experienced in the job you see not the same events happening, but similar sorts of events so you draw on the experience that you've [had] before … I mean if you've got a passenger who is getting violent or aggressive … well I've seen it where a new member of the crew is a bit lost because it's a bit daunting to have a six foot guy who's had one too many beers shouting at them.[45]

Elizabeth Powell, who worked as cabin crew for BOAC between 1969 and 1975, concurred. She said that issues with passengers – or indeed other crew members – who were 'a bit worse for wear' could be particularly 'upsetting when you find you can't control it'.[46] Elizabeth Powell described one particularly trying instance, an occasion when the chief attendant was inebriated in flight. She and her colleagues in the flight deck organised a means of dealing with the situation so as not to alert the passengers. Though lesser qualified than some other flight attendants, Elizabeth Powell took charge of the cabin, splitting herself 'between the first class and the back' for

[44] Interview with Matthew Hart, 26 January 2017.
[45] Interview with Charles Green, 21 November 2016.
[46] Interview with Elizabeth Powell, 30 January 2017.

meal service, 'as the chief would have done'.[47] In this instance crew members worked hard – physically and emotionally – to ensure that passengers were unaware of the situation. As Elizabeth Powell recalled:

> We were smiling with the passengers out there, getting on with our job the best we could … And everybody worked their socks off to make sure that none of the passengers ever noticed there was anything wrong.[48]

Elizabeth Powell and her colleagues sought, as a matter of course, to shield passengers from the difficulties they were experiencing with their chief of staff and, as such, in this instance emotional labour was required. It is important to note, however, that Elizabeth Powell and the other retired cabin attendants interviewed for this thesis were keen to emphasise that these instances did not occur regularly. As such, though emotional labour was expected in instances of high stress, cabin staff did not endure tiring emotional labour on a day-to-day basis.

Flight attendants often tried to resolve difficult situations on their own, at least initially, but it was common practice to involve senior cabin staff and flight deck crew if passenger behaviour did not improve rapidly. In situations where passengers did not respond to cabin attendants, flight deck crew were called on to defuse tensions. Elizabeth Powell remembered one instance with a particularly uncooperative male passenger that required her to bring 'the captain into it'. Finding that she 'couldn't control the person', she requested

[47] Ibid.
[48] Ibid.

that the captain 'come down and have a word': 'This guy was standing in the middle of the aisle, and … as [the captain] walked up this guy said "oh my God here comes God".'[49] This practice created, according to Hochschild, a gendering of emotional labour.[50] It was, she argued, one 'sort of job for a woman and another sort of job for a man'. For men, the principal hidden task was to maintain his identity in a 'woman's occupation' by coping with difficult passengers 'for' female colleagues. For women on the other hand, emotional labour involved dealing with the displaced anger and frustration of passengers calmly, in a way that would not attract the attention of other passengers.[51]

Hochschild's thesis, based on the assumption that flight deck crew and senior cabin staff were almost all male and cabin staff were mostly female, does not hold here. In Britain, unlike America, flight attendant work was not sharply gendered in the post-war period.[52] Women were in the majority, but did not entirely dominate the workforce. In 1973, for example, 4,750 women and 2,355 men were employed as cabin crew by British airlines.[53] Women were likely to hold positions junior to their male counterparts, however. This was due, at least in part, to the propensity for male crew members to stay in the role for longer. Female cabin attendants were, until the 1980s, expected to retire on marriage.[54] For this reason, female crew members were less likely to ascend the career ladder and, as such, male and female crew members often

[49] Interview with Elizabeth Powell, 30 January 2017.
[50] Hochschild, *The Managed Heart.*
[51] Ibid. p. 172.
[52] Phil Tiemeyer, *Plane Queer: Labor, Sexuality, and AIDS in the History of Male Flight Attendants*, (London: University of California Press, 2013); in the 1980s men made up 15% of the cabin crew workforce in America, Hochschild, *The Managed Heart*.
[53] TNA BT 248/511: CAA Committee on Flight Time Limitations Working Paper, 'Background Notes: Cabin Attendants', 5 September 1973.
[54] Kathleen M. Barry, *Femininity in Flight: A History of Flight Attendants*, (London: Duke University Press, 2007).

took different roles. Men worked on the bar, or in managerial positions, and women 'did the sales of the perfume and things'.[55] Both male and female cabin attendants, however, had contact with passengers and, though female attendants found themselves the target of verbal abuse more often than their male counterparts, all were expected to manage passenger behaviour and, if necessary, engage in surface acting.

It is worth dwelling, briefly, on the place of nostalgia in cabin crew narratives. Historians often dismiss nostalgia, the expression of an idealised and often longed-for past, as false historical consciousness. Nostalgia is not, however, synonymous with misrepresentation or fabrication. Oral historians, such as Jennifer Helgren, have argued that nostalgia often serves a purpose.[56] Nostalgic departures from fact allow historians to explore how individuals invest past experiences with meaning. Many of the testimonies presented here are self-consciously nostalgic for a culture that no longer exists in commercial aviation. For many of the men and women employed as aircrew in post-war Britain, flight was special. It was an occasion passengers dressed for: 'Females dressed the part. Guys wore lounge suits and ties'.[57] In this narrative, passengers are painted as quiet, respectful and bound by the rules of social etiquette. These nostalgic reflections offer an often barely veiled critique of the present. A number of the former flight deck crew and cabin attendants interviewed for this thesis commented with distaste on the changes associated with low-cost operation. Lack of respect and abusive behaviour are, many argued, now commonplace in the cabin. As one former

[55] Interview with Rose Green, 21 November 2016.
[56] Jennifer Helgren, 'A "Very Innocent Time": Oral History Narratives, Nostalgia and Girls' Safety in the 1950s and 1960s', *The Oral History Review*, 42, 1 (2015) 50-69.
[57] Interview with Charles Green, 21 November 2016.

pilot put it: 'I don't know how … [today's] cabin staff put up with some of what they do'.[58] A number of retired cabin attendants commented in interview that, given the changes to commercial aviation, they would not seek employment as cabin staff today. It is unlikely the division between post-war and present-day operations is quite as stark as that presented by some interviewees, given that low-cost airlines operated increasingly from the 1980s. Indeed, cabin crew work could be emotionally trying at times throughout the century, even for those employed by national carriers.

While difficulties with passengers were by no means commonplace, at times when emotional labour was required the strain of surface acting was often exacerbated by the space of the aircraft. There were very few private crew-only spaces available prior to the introduction of the Boeing 747 in the 1980s. For much of the century then, crews performed duties almost entirely in view of passengers. In instances where privacy was required, however, crews had ways of creating it. Elizabeth Powell recalled an instance where, to stop her from becoming agitated, her chief locked her in the on-board toilet: 'I was getting very tense and my chief threw me in the loo and locked the loo from the outside. [Laughs] "Stay in there until you've calmed down!"'[59]

The lack of in-flight privacy also had implications for how crew members rested during and after meal services. Prior to the introduction of the Boeing 747 by BOAC in the 1980s, the staff area on many long-haul planes was permeable to passengers. It was, as Charles Green recalled, merely a 'curtained off area' with passenger seats, a place for crew members to 'have a

[58] Interview with Andrew Murray, 4 March 2016.
[59] Interview with Elizabeth Powell, 30 January 2017.

break and have a meal'.[60] As Charles Green explained, however, cabin attendants were rarely screened entirely from passengers during their break periods:

> You were in full view of the passengers, so invariably somebody would want something. It's like anybody who does whatever job, you like some time away from your work even for an hour but you couldn't do that if you were sat in a position like that. So often you couldn't say it was a very good rest at all. Well it wasn't a rest it was a meal.[61]

As Charles Green's testimony suggests, the lack of privacy of the crew rest area on long-haul flights meant that surface acting was required from crews throughout the working day. They were always on display to passengers, even during scheduled rest breaks.

The permeability of the crew rest area also had implications for the physical rest that crews could achieve. As Julia Evans recalled:

> You never had the chance to sit down and have a proper meal. Even if you sat down to eat, and even if you were allocated some time off, the bell rings and somebody wants you, they're your fare-paying passengers, they're going to take priority. You could be sitting on a seat … everyone would be watching a movie or something and then the curtain would go back and … someone or four, five people would want something. So that's fine, that's what we're they're for, well apart from safety.[62]

[60] Interview with Charles Green, 21 November 2016.
[61] Ibid.
[62] Interview with Julia Evans, 28 November 2016.

Given that the crew rest area was located within the aircraft's main cabin prior to the introduction of the Boeing 747 in the 1980s, passengers often disturbed crew members during their rest breaks. Flight attendants had little emotional privacy and their opportunities for uninterrupted rest were limited. The retired cabin crew interviewed for this thesis tended to emphasise the implications of this – fatigue – rather than the apparent burden of emotional labour in their testimonies. What follows here, then, aims to extend Hochschild's thesis. It argues that, though much of the literature produced on the health and wellbeing of cabin crew in the past twenty years has focused primarily on emotional labour, these issues were not prioritised in the years prior to this. Indeed, I argue in what follows that while emotional labour was certainly expected of crew during particularly difficult moments, it did not define the experiences of cabin attendants working for commercial airlines in post-war Britain.

Physical Exhaustion and Circadian Dysrhythmia

In the twentieth century, the health of flight deck crew was well studied. Little attention was, however, paid to the health hazards of cabin crew work. Indeed, though pilot fatigue was widely researched and regulated during and after World War Two, there was no serious discussion of fatigue as it pertained to cabin crew until the late 1960s.[63] In 1969 the British Airways Medical Service carried out the first study of cabin crew workload and fatigue. The research team published their findings in a series of articles from 1973.[64]

[63] Anon, 'Any Questions?', *British Medical Journal*, 4, 5572 (1967) 167.
[64] F. S. Preston, H. P. Ruffell Smith, V. M. Sutton-Mattocks, 'Sleep loss in air cabin crew', *Aerospace Medicine*, 44, 8 (1973) 931-935; R. M. Barnes, 'Physical energy expenditure in long-haul cabin crew', *Aerospace Medicine*, 44, 7 (1973) 783-785; F. S. Preston,

The study examined the entire lifestyle of cabin attendants. As Isaac Shaw, who partook in the study, recalled:

> The idea was you kept a sleep log for three months, a little yellow book, and some time during that three months they hoped to get one of the BOAC doctors to fly with you and take your blood pressure … they'd … stay in the same hotel and do the same routine. That didn't happen. It happened with a few people but I never saw one, most people didn't I think.[65]

As Isaac Shaw described, researchers rarely flew with crew members. Like many other studies of flying fatigue in the post-war period, the BOAC investigation relied instead on self-reports, in this case the records produced by cabin crew. Crew members were asked, as reported by Isaac Shaw, to keep detailed sleep logs for six months in which they were required to:

> Say obviously the date, what time you woke up, GB and local, if you were working or if it was a rest day, what the work pattern was or if you had a day of rest at home, and then when you went to bed, how tired you felt when you went to bed and so on. And you marked it one to ten, with an arrow.[66]

Based on the self-reports of 140 stewards and stewardesses, the study concluded that long-haul cabin crews had to contend with three major issues: circadian dysrhythmia, sleeplessness, and menstrual problems. Time zone

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'Physiological Problems in Air Cabin Crew', *Proceedings of the Royal Society of Medicine*, 67, 9 (1974) 825-829.

[65] Interview with Isaac Shaw, 26 January 2017.

[66] Ibid.

changes, resulting in circadian dysrhythmia, were deemed to have the greatest effect on performance and wellbeing. The study suggested that this was 'probably the greatest problem facing the airline crew member'.[67] This problem, the study concluded, was at its most acute during round-the-world trips, where crews could be away from base for up to twenty-one days. In these instances, where crew members were continually moving and crossing new time zones, there would be 'frequent adjustment to biological rhythms'.[68] In these instances circadian disruption and fatigue were, the report concluded, practically inevitable.

These conclusions broadly reflect the narratives constructed by cabin crew. Almost every retired flight attendant interviewed for this thesis commented that the circadian disruption associated with long-haul flight was by far the most difficult issue they had to contend with as a result of work. Indeed, some crew members purposefully transferred from long-haul to short-haul work to avoid crossing time zones. Isaac Shaw, who transferred from BOAC to BEA part-way through his career, said that becoming a 'flat-earther' was the 'best thing' he ever did for his health.[69] When asked why he transferred from BOAC to BEA, he cited 'tiredness':

> It was less money but it was certainly worthwhile in health and lifestyle … When you worked for BOAC you started your trip and at the end of the trip you got so many nights off, not days, so many nights off after the trip depending on its length. So let's say you did … an eight-day

[67] Preston, 'Physiological Problems in Air Cabin Crew', p. 826.
[68] Ibid. p. 825.
[69] Interview with Isaac Shaw, 26 January 2017; 'flat-earther' is a colloquial term used within civil aviation to refer to crews who flew short-haul and, thus, did not see the curvature of the earth.

> trip, you'd get four nights off, which is three days. So the first day you were totally shattered. As soon as I got in I just went to bed, that was it. The second day you were getting over it. The third day you were preparing to go on your next trip, and then the fourth day you went on your next trip. And so you were continually going east one time, west the next time, you'd just got over one, or you thought you did, and you were off somewhere to do it again. Whereas when I went … to short-haul, we had a six-three roster, so they could do what they wanted with you for six days, obviously within flight limitations, but then on the three days off, and it was sometimes three and a half if you had an early on your last trip, you were totally with it for the three days, and you knew when you were going away you didn't have to mentally prepare to be going to Australia or anything like that. You were just going to be going there and back or just a quick night stop, and to me that was brilliant.[70]

Julia Evans also cited circadian dysrhythmia as one of the reasons she transferred from long-haul to short-haul flying. She made the decision after a series of particularly difficult trips:

> I'd done an LA and back, I'd had four nights at home, that was minus eight. I'd done an Anchorage and Tokyo following that, which was minus seven plus eight minus seven, and I got in this house and I couldn't sleep at all. Nothing worked. My digestive system didn't work, my sleeping patterns didn't work, my skin was all pasty, and I didn't feel well. I was doing the laundry at three in the morning. I couldn't sleep. Twelve o'clock I was somewhere else, maybe in bed for an hour and getting up again. So that was … when I went to short-haul.[71]

[70] Interview with Isaac Shaw, 26 January 2017.
[71] Interview with Julia Evans, 28 November 2016.

Julia Evans, like many of her colleagues, found sleep difficult after transmeridian flight. These difficulties were compounded when flights were closely spaced, as Elizabeth Powell explained: 'that was constantly there especially with the very short, you know, there and back trips'.[72]

The only 'cure' for circadian dysrhythmia was a rest-and-recovery period of sufficient length for the body to readjust.[73] Though, as Ross McFarland of Harvard's School of Public Health, commented in a 1975 paper on transmeridian air travel, there were 'great individual differences' here, most people required several days to adapt to time zone changes.[74] Given the nature of the job, however, cabin crew were rarely allotted enough time off to completely recover from the effects of transmeridian travel. Medical sociologist Roberta Lessor suggested in 1985 that, for this reason, many flight attendants engaged in drug taking, namely the use of 'uppers' and 'downers' to be able to wake up and work or go to bed and sleep at times that were 'foreign' to their routine.[75] None of the retired flight attendants interviewed for this thesis confessed to using stimulants, but several, mostly female, crew members who worked for BOAC in the 1970s recalled taking sleeping pills such as Mogadon during their long-haul careers. Crew members, in the main, only used sleeping tablets when they felt they really needed them. They were, as Elizabeth Powell described, a 'sort of back up', not to be 'taken as a matter of course'.[76] There was a recognition among cabin crew that hypnotics were not a good long-term solution to circadian dysrhythmia, and some crew

[72] Interview with Elizabeth Powell, 30 January 2017.
[73] Lessor, 'Consciousness of Time and Time for the Development of Consciousness', p. 200.
[74] Ross A. McFarland, 'Air Travel Across Time Zones', *American Scientist*, 63, 1 (1975) 23-30, p. 25.
[75] Lessor, 'Consciousness of Time and Time for the Development of Consciousness', p. 200.
[76] Interview with Elizabeth Powell, 30 January 2017.

members felt that taking sleep pills made them 'feel worse in the end', so they were reserved for particularly acute episodes of sleeplessness.[77]

The other major contention of the BOAC report – that the physical energy expenditure of cabin crew was within acceptable limits – was, however, not supported by the testimonies of crew members. In the BOAC study the physical energy expenditure of crews was measured during training mock-ups using a Max-Planck respirometer.[78] The subject wore a respirometer on their back. In this way all expired gases could be measured and analysed. For each task the expected energy expenditure was then calculated in kilojoules. The study found that the energy expenditure of a stewardess on an average day was 'above that of an average shop assistant', but 'about equal to a young housewife'.[79] Some trips, however, elicited greater energy expenditure. The energy expended by cabin attendants on the London to Miami flight, for example, was 'comparable with that of a building worker or a steel worker but somewhat less than that of a farmer or coal miner'.[80] Generally, though, it was agreed that the physical energy expenditure of cabin attendants was within acceptable limits.

These conclusions were not reflected in the narratives of the men and women I interviewed. The physically demanding nature of the job was stressed by several of the retired crew members interviewed for this thesis. Many former flight attendants noted the large amount of walking involved, as Julia Evans put it: 'you'd walk twelve, fifteen miles across the Atlantic'.[81] This

[77] Interview with Rose Green, 21 November 2016.
[78] Barnes, 'Physical energy expenditure in long-haul cabin crew'.
[79] Preston, 'Physiological Problems in Air Cabin Crew', p. 827; Ibid. p. 828.
[80] Ibid. p. 827; Ibid. p. 828.
[81] Interview with Julia Evans, 28 November 2016.

was made all the more difficult by the movement of heavy carts, full of duty-free goods. Female crew members measured their activity by the fit of their shoes. Elizabeth Powell recalled that, after particularly busy days, her feet would often swell:

> Because you're on the run all the time you will get off the other end absolutely exhausted. And I can remember a few trips where I came down the steps of the aircraft with my shoes in my hands … Because you run around so much you know your feet swell, and you just couldn't put your shoes on to get back off the plane.[82]

To alleviate the swelling in their feet, flight attendants were advised by BOAC's medical officers to adopt a restorative yogic pose – viparita karani, otherwise known as legs-up-the-wall pose. Julia Evans recalled that, after arriving at the crew hotel post-flight, crews would shower and then adopt the pose before going out for the evening: 'You'd just put your legs up against the wall to allow the blood to settle back down again and we used to do that and read newspapers.'[83]

The fit of shoes was at once a litmus test for effort, and a cause of fatigue. Joan Sanger and Julia Smith have argued that walking up and down the aircraft cabin in high-heeled shoes could be exhausting.[84] The uniform requirements for female members of staff had, thus, broader implications. High-heeled shoes literally generated fatigue, but in other ways uniform mitigated these effects. Common attire fostered a sense of shared identity.

[82] Interview with Elizabeth Powell, 30 January 2017.
[83] Interview with Julia Evans, 28 November 2016.
[84] Sangster and Smith, 'Beards and Bloomers'.

Like nurses and other medical professionals, flight attendants wore a uniform that set them apart from others in their work space.[85] It marked them out as a distinct collective and, as the following section attests, this cultivated communal ties that helped, in some instances, to mitigate the effects of fatigue.

The oral testimonies presented here suggest that Hochschild overstated the costs of emotional labour. In line with the conclusions of later sociologists, these testimonies suggest that, for the most part, crew members enjoyed their work. On the whole, they found interactions with passengers pleasurable and appreciated the perks of the job: travel to exotic locations, the opportunity to stay in 'five star hotels', and 'access to celebrities'.[86] These testimonies instead suggest that a major cost of cabin crew work was physical tiredness. While only two former flight attendants interviewed for this thesis cited fatigue as their primary concern, all recalled at least one instance where they experienced overwhelming exhaustion as the result of work. Elizabeth Powell, for example, recalled that while most of the time she could 'keep up with the comings and goings of our strange times' when things were 'going smoothly', she said that she did experience fatigue in certain circumstances.[87] She suffered from 'nervous exhaustion' following a period of intensive scheduling and 'heavy workload' during the 1971 India-Pakistan War, and sometimes experienced fatigue in flight if she 'didn't manage to get a few hours of extra sleep before pick-up' for a long-haul flight.[88] She described one

[85] Penny Starns, *Nurses at War: Women on the Frontline 1939-45*, (Stroud: Sutton Publishing, 2000).
[86] Interview with Jacob Evans, 28 November 2016.
[87] Interview with Elizabeth Powell, 30 January 2017.
[88] Ibid.

instance where she felt particularly fatigued following a bad night's sleep and a delay prior to take-off from New York:

> I was so tired because I hadn't managed to get that kip in the afternoon. That extra time meant when everybody got their heads down and we'd fed them and they were all asleep, I got a couple of blankets and lay down on the galley floor, and I fell asleep for about half an hour, three quarters of an hour, just to keep me going. I was so tired, I laid my head down on the floor and I could hear the workings of everything going on under the floor, and I thought I'm never going to sleep in this noise but I was just so tired that I did doze off for half an hour. It felt like desperation and it was, it was at that point where I knew I wouldn't be able to still be on my feet and serving breakfast, if I didn't actually close my eyes for a short while.[89]

In this instance Elizabeth Powell was able to alleviate fatigue by taking a short unscheduled rest break during a period of light workload. This was possible because other crew members agreed that they would cover her duties while she rested. Anecdotes of this type peppered the testimonies of many of the former flight deck and cabin crew interviewed for this thesis. What follows here examines the communal management of fatigue in more detail.

Crew Relations and Fatigue Management

The physical and emotional pressures of civil aviation, coupled with long periods away from home, fostered intense friendships. These relationships were, however, often short lived as crews changed with each trip. Wouters has argued that the 'social promiscuity' of cabin crew friendships could be

[89] Ibid.

emotionally damaging. Indeed, he cited 'social promiscuity' as the primary emotional 'danger' of cabin crew work.[90] This does not, however, reflect the lived experiences of flight attendants employed by British airlines in the post-war period. Indeed, many of the retired cabin attendants interviewed for this thesis reflected fondly on the supportive friendships that grew out of intensive periods of togetherness during trips. Charles Green recalled of his working relationships at BOAC:

> Camaraderie was very very good, and I think that was the great thing about flying, that you met a group of strangers at Heathrow … and all the way through it, you would hear details of their private life that they would probably never discuss with people outside … because you became so close as a family for that short time.[91]

As Charles Green described these ties of friendship were often short-lived: 'when you got back to London … you might not see one another again'.[92] The spatial and temporal limitations of relationships did not, however, dull their intensity. The friendships fostered on trips were socially important. Elizabeth Powell recalled of her time working at BOAC that:

> In long-haul in particular, if you're going away for any length of time you're each other's family. You've got no one else to refer to when things are wrong, in the way that you would go home and talk something over with your family. We talked amongst ourselves.[93]

[90] Wouters, 'The Sociology of Emotions and Flight Attendants', p. 118.
[91] Interview with Charles Green, 21 November 2016.
[92] Ibid.
[93] Interview with Elizabeth Powell, 30 January 2017.

'We were', she concluded, 'each other's family. You had to be'.[94]

Civil aviation presented a number of health challenges. Illness was frequent. Food poisoning and 'tummy upsets' were particularly common complaints. As former pilot Gerard Hunt described, 'you'd go to India and people would get jippy tummies … they'd get … Bombay belly'.[95] The close, if short-lived, relations between crew members were important in these instances. Elizabeth Powell described how crew members cared for each other during periods of illness:

> We took care of each other. If somebody wasn't well, a couple of members of the crew would make sure they were OK, go to the pharmacist and get them something to take.[96]

Crew relations also had important implications for fatigue management. What follows here is structured in two parts. The first examines how crews managed fatigue communally in flight, with a particular focus on informal rest breaks. The second outlines the importance of relations between crew members and, importantly, between crew members and airline executives in decisions about discretion.

Controlled Rest in the Cabin and the Cockpit

From 1975, both flight deck and cabin crew were required to have rest periods scheduled by the companies they worked for in accordance with the regulations laid down in Civil Aviation Publication (CAP) 371. On long-haul

[94] Ibid.
[95] Interview with Gerard Hunt, 8 February 2017.
[96] Interview with Elizabeth Powell, 30 January 2017.

flights all members of crew were allocated a rest period in a bunk, but some found it difficult to rest or sleep in this environment. Stephen Harris, who worked as cabin crew between 1989 and 2013, found 'switching off' difficult:

> You've done everything and you'll be lying in your bunk and you'll be like 'oh I never got that coffee for 13C', or … 'oh so and so asked me for something'. Switching off was very difficult.[97]

Emotional disconnection from work was difficult for Stephen Harris. For many others, though, the physical space of bunks was an issue. As one former flight engineer put it, bunk rest was not 'conducive to good sleep'.[98] Bunk areas in long-haul aircraft were often cramped and resting crew members were sometimes disturbed by their colleagues during periods of bunk rest. Retired flight engineer Jeffrey Cooper suggested in interview that, given the cramped conditions, resting crew members often found themselves being clambered over by others: 'there was the crew change and you were sleeping on a bunk and someone climbed over the top'.[99] As such, fatigue remained a common complaint, even after the introduction of bunk rest in the 1970s. Cabin and flight deck crews continued to rely on informal practices, developed during and immediately after World War Two, for the management of fatigue in flight.

In the cockpit, flight deck crews instituted an in-seat rest rota, a practice widely referred to as controlled rest in present-day literature. Flight crew first instituted this system prior to the introduction of bunk rest on long-

[97] Interview with Stephen Harris, 7 December 2016.
[98] Interview with Jeffrey Cooper, 24 January 2017.
[99] Ibid.

haul flights. As James Hall, who worked as a pilot for BOAC from the mid-1960s, recalled:

> I was the first officer of course on 707s and 747s, and if you were with a good captain he would say 'hey look you go off … watch for a couple of hours', sitting in what's basically a very uncomfortable pilot's seat, 'and just have a zizz and I'll mind the [controls] and then when you come to I'll have a little zizz' and that was the way it worked on those sort of airplanes.[100]

The release of the sleeping flight crew story in 1972 made regulators critical of this practice, but it nevertheless remained widespread throughout the latter decades of the twentieth century. Crew organised in-seat rest between them though, as former flight engineer Jeffery Cooper recalled, the captain had the final say: '"can I close my eyes for a minute?" and he'd say yes or no'.[101] If everything was in place and workload was low, captains would often allow other members of the flight crew to have a short in-seat rest. Crew members tacitly agreed that each of them would be allowed to rest at some point during flight, and so rarely slept for more than twenty minutes each. Instances where crew members slept for longer were unusual. As former captain Gerard Hunt recalled:

> I remember one time coming back on a DC-10, and the co-pilot just didn't feel very well at all, and when we got to the cruising level which would be what half an hour after take-off, I said 'well look, you know, just have a sleep'. Anyway he slept and he slept and he slept, until we

[100] Interview with James Hall, 30 March 2016.
[101] Interview with Jeffrey Cooper, 24 January 2017.

> got to Ireland, and every time he kind of turned over I thought oh he's going to wake up now, I'll be able to close my eyes for a few moments myself.[102]

In this instance Gerard Hunt's co-pilot slept for an extended period, far longer than the twenty-minutes he had expected when he had sanctioned the rest. For the most part though, the system 'worked quite well', and all flight deck crew were able to benefit from short in-seat rest periods.[103]

Flight attendants instituted a similar system. A number of interviewees recalled that, if an aircraft was not at full capacity, crew members would rest in the cabin, often covered by a blanket to shield themselves from passengers. In other instances, cabin attendants slept on the floor of the galley between meal services. As in the flight deck, these informal periods of rest in flight were arranged between cabin staff on a principle of reciprocity and mutual benefit. They were organised to ensure firstly, that every member of crew was allocated an informal rest period at some point during flight if they so wished and, secondly, that the workload of resting crew members was covered. As Elizabeth Powell recalled, the allocation of informal rest periods in the cabin was rarely problematic:

> A nap on board? Well we usually … would say 'oh I'm alright you go and have a lie down'. You know if somebody started to … say 'oh God I'm feeling weary I didn't get [any] sleep this afternoon'. You'd say 'when we've finished the meal service pull a blanket over you so that nobody can see you'. [Laughs] … But we … gave to each other. Nobody went 'I want to go first' or anything like this … it was just very

[102] Interview with Gerard Hunt, 8 February 2017.
[103] Interview with Paul White, 17 March 2016.

> co-operative. We were all very co-operative on the plane, you needed to be.[104]

In these informal instances of crew rest, then, crew members tended to cooperate. There was a tacit recognition on all sides that if one crew member was permitted to rest by their colleagues, the favour would be returned, so that all crew members benefitted from this system. In other instances, though, external pressures complicated crew relations.

Discretion and Crew-Management Relations

When CAP 371 came into force in 1975 it relied on an existing, though underused, concept: captain's discretion. Referred to in regulatory discourse since the 1960s, discretion allowed captains to extend flying duty periods beyond the maximum limitation of fourteen hours. For the Bader Committee, discretion was necessary to allow operators to legally field crews in certain situations.[105] 'We consider', the Committee stated, 'that it remains necessary to retain provision for the commander of an aircraft to extend a Flying Duty Period beyond the maximum which may be scheduled, providing circumstances warrant such action'.[106] Discretion was only supposed to be used in 'exceptional circumstances' but, as Charles Green recalled, it 'used to happen quite a bit to get the operation done'.[107] This was permitted under CAP 371 because, although captains were legally required to notify the airline

[104] Interview with Elizabeth Powell, 30 January 2017.
[105] As in previous chapters, the Committee on Flight Time Limitations is referred to as the Bader Committee.
[106] TNA DR/13/4: Douglas Bader, 'Report of the Committee on Flight Time Limitations', June 1973, p. 19.
[107] Interview with Charles Green, 21 November 2016.

when discretion was used, they were not obliged to inform the CAA if the flying duty period was extended by less than two hours.[108] As a Confidential Human Factors Incident Reporting Programme (CHIRP) Incident Report noted in 1987, because of this the CAA could not identify flights that regularly required 'discretionary time due to unrealistic rostering'.[109] Aware of this apparent loop-hole a number of operators intentionally scheduled flights up to two hours above the limits laid down in CAP 371, operating to the letter of the regulations rather than in their spirit.[110]

The decision to extend flight duty periods ultimately lay with the captain. The consent of the entire flight deck and cabin crew was, however, usually sought. As former captain Gerard Hunt recalled:

> I would talk to the crew and … say 'look how is everybody feeling?' Including the cabin crew, and if someone said 'I just cannot do it because I am so tired I might become unsafe' I'd say 'fine we won't do it'.[111]

Flight deck and cabin crews may not have worked together prior to a request to go out of hours. It was common, for example, for cabin attendants to work almost a full day before flight crew joined them.[112] Cabin attendants often discussed their thoughts initially as a group, and then each had a chance to

[108] Confidential Human Factors Incident Reports: Feedback No. 15, December 1987, available at https://www.chirp.co.uk/newsletters/air-transport [last accessed 23 March 2016].
[109] Ibid. p. 5.
[110] Confidential Human Factors Incident Reports: Feedback No. 26, March 1992, p. 3, available at https://www.chirp.co.uk/newsletters/air-transport [last accessed 23 March 2016].
[111] Interview with Gerard Hunt, 8 February 2017.
[112] Interview with Julia Evans, 28 November 2016.

speak privately with the chief of cabin staff. As former flight attendant Stephen Harris described:

> So away from the flight crew we would have a chat, the whole crew and we had to come to a unanimous decision if there was any sort of doubts in why we were going, the people that were on the sort of edge of 'do we go don't we go' would then have an opportunity to talk to the CSD [Cabin Services Director] on their own, because it might be that they don't want to discuss why they don't want to go, and they don't want to feel pressured so they might sort of go and have a little chat but … everybody had to agree.[113]

Ultimately then, consensus was necessary. As Stephen Harris reflected though, the need for unanimity could cause problems:

> Everybody's got a different lifestyle … somebody might be at home and they've had the same days off as you but they've got two kids … they've had to run around they haven't had their sleep … maybe they didn't sleep on their crew rest, or they were in their hotel and they didn't sleep.[114]

Even when crews had worked the same or very similar rosters, their personal circumstances impacted on their quality of rest and consequent alertness. A unanimous decision was, therefore, often difficult to reach.

Other interviewees described a further problem with discretion: the requirement to appraise prospective lethargy. As former pilot Gerard Hunt

[113] Interview with Stephen Harris, 7 December 2016.
[114] Ibid.

explained, this was particularly difficult for long-haul crews who were expected to gauge how they would feel in up to twelve hours' time:

> I think the difficult thing about it is how do you judge yourself how you're going to feel in eleven hours' time … particularly on long-haul … I can understand it more on short-haul where you're doing maybe two or three sectors and you know the last route, 'I'm just too tired to do that last bit I'm not going to go into discretion'. But … in long-haul … you have to decide whether you're going to go into discretion … before you've taken off … how do you throw your mind forward, think how bad you'll feel?[115]

In part because of the difficulties involved in imagining how he would feel in the future, Gerard Hunt said that he would normally 'just try and get on with it' and agree that flight times could be extended.[116]

Airlines employed a carrot and stick approach to encourage compliance with discretionary requests. Large airlines, such as BEA and BOAC offered incentives. These were not part of official policy, but were widely employed on an informal basis. For example, it was commonplace for crew members to be scheduled on a 'really good trip' if they agreed to extend their duty hours, as a form of compensation. As former cabin attendant Jacob Evans recalled:

> There was always that sweetener, that … you could have a really good trip the next trip. You could have a ten-day St Lucia. Now if you went out of hours you would lose that ten-day St Lucia, somebody else

[115] Interview with Gerard Hunt, 8 February 2017.
[116] Ibid.

> would get it. So it was very tempting to … hang on to that trip and just say, 'we'll give the company another half an hour' … it was a little carrot.[117]

For cabin attendants working for major airlines, there was also a significant financial incentive to work beyond scheduled hours. The daily overseas allowance assigned to cabin crew increased with the number of hours worked. As such, when cabin crew extended their duty hours they were financially compensated. Retired cabin attendant Patrick Smith said that this was a major incentive:

> There was daily overseas allowances overtime which was a rate after nine hours … higher rate after ten hours, higher rate after twelve hours, higher rate after fifteen hours, after seventeen hours it just went through the roof … That was an incentive … if there's a financial reward then you do it … sometimes it was only a matter of forty-five minutes, fifty minutes, an hour, you'd just do it.[118]

Employing a system widely used in pay and productivity deals in civil aviation and the wider workforce, the national carriers financially compensated crew members who agreed to work beyond their scheduled hours.[119]

Smaller operators and charter companies, however, tended to employ a strategy of deterrents. Low-cost carriers, such as Dan Air and Laker Airways, were known to threaten crews with termination if they refused to use

[117] Interview with Jacob Evans, 28 November 2016.
[118] Interview with Patrick Smith, 3 February 2017.
[119] Chapter Four examines pay and productivity deals in more detail.

discretion. For this reason Isaac Shaw, who worked for BEA and BOAC throughout his career, felt 'very lucky' to work for a national carrier:

> We had a bit of clout, and so we could stand up to them. But if you were with people like Freddie Laker and so on, then you were out of a job … They used to say sell your bed and fly for free.[120]

Trade unions were concerned that, for this reason, discretion put undue pressure on flight deck and cabin crew. The British Airline Pilots Association (BALPA) voiced concerns about this to the Bader Committee, prior to the introduction of CAP 371. The Association's Flight Fatigue Report, formally presented to the Bader Committee in 1972, stated that:

> The legislation allows the pilot to extend duty periods at his discretion – a feature of great value to the Operators. However, it does not protect him against retaliation from his management if he chooses not to extend his duty period, should this appear to him to be prudent.[121]

The Bader Committee did not, however, take heed of BALPA's concerns and, as Chapter Three has shown, discretion continued to be allowed under CAP 371.

With the growth of inclusive tour operators and low-cost carriers in the 1980s, more airlines than ever rostered crews to the 'absolute limit of CAP 371'.[122] As such, the slightest delay necessitated the use of the captain's

[120] Interview with Isaac Shaw, 26 January 2017.
[121] MRC MSS.248/4/2 BALPA, 'Flight Fatigue: Report of the Special Committee', second edition May 1972 with notes by Ninian Davies, p. 39.
[122] MRC MSS.248/8/1: Roger Green and Roy Skinner, 'CHIRP and Fatigue', *The Log*, 48, 5 (October 1987) 6-11, p. 8.

discretionary power to extend the duty day. Trade unions, and increasingly CHIRP, argued that in these instances flight deck and cabin crews had little choice but to extend their duty day 'for fear of action against them'.[123] The testimonies of pilots and cabin crew employed in the late 1980s and early 1990s attest to this. Julia Evans, who worked as cabin crew for a Dorset-based airline in the 1990s, found herself under 'an awful lot of pressure' to agree to extend her duty day on one occasion. As she explained:

> I had gone up to the airport and it was foggy and so they bussed us to Southampton. We got to Southampton and Southampton got fog bound so they bussed us back. So we fiddled about with this for about six hours … we'd been up since six in the morning at the airport, this was going to stretch well past midnight. You could see where it was going … [so] I pulled the crew on that … [the Managing Director of the airline] went ballistic … I did think that was my job gone.[124]

Julia Evans estimated that, in total, the episode cost the airline around £500,000 in hotel fees and compensation. As a result, she was certain she would lose her job but her colleagues, including the aircraft's captain, supported her decision and she remained in post.

Pilots based at small airlines were also subject to 'a lot of pressure' not to report fatigue.[125] Philip Gray, a pilot who spent a number of years 'doing nights with DHL', described an instance where he refused to extend a duty period as the result of fatigue:

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[123] See for example: Confidential Human Factors Incident Reports: Feedback No. 25, November 1991, p. 4, available at https://www.chirp.co.uk/newsletters/air-transport [last accessed 23 March 2016]; Confidential Human Factors Incident Reporting Programme: Feedback No. 26, p. 3.
[124] Interview with Julia Evans, 28 November 2016.
[125] Interview with Philip Gray, 26 January 2017.

> A lot of pressure. But because … I was at the top end of my career, they needed me more than I needed them I was able to weather it and I just bore the consequences. But … you have to remember that especially in the DHL operation at night, there [were] no managers there so it was all down to the roster staff … They have pressure put on them that they have to get this done, and then if you're ringing up and saying 'no I ain't doing it', then they have to ring up a manager who's at home asleep, so it's a different thing. There's a lot of pressure put on them as well.[126]

As Philip Gray's testimony suggests, there was pressure on employees throughout the company to ensure that flights took place as planned. These pressures, coupled with the financial and social incentives for flight deck and cabin crews to extend their duty hours, caused some instances of what would now be termed presenteeism. None of the former pilots, flight engineers, or cabin attendants interviewed for this thesis recalled instances where they agreed to extend their duty day when they did not feel fit. A number of interviewees said, however, that for the most part they just tried to 'get on with it', indicating that personal and health considerations were not important.[127]

Conclusion: Closing the Communication Loop

Though a deeply personal issue experientially, fatigue was also a social experience for workers in the aviation industry. As this chapter has demonstrated, throughout the post-war period in-flight fatigue was managed communally. Flight deck and cabin crews instated informal systems of in-seat rest that allowed crew members the opportunity to sleep during flight outside

[126] Ibid.
[127] Interview with Gerard Hunt, 8 February 2017.

of officially sanctioned rest periods. This was made possible by the goodwill of other crew members. Throughout the post-war period then, crew relations were of crucial importance to flight safety. This was not, however, recognised at a policy level. Though some researchers and airline employees, including Hugh Patrick Ruffell Smith (1911-1980) and Kenneth Bergin, discussed the importance of relations and the psychology of leadership in the 1960s and 1970s, it was only in the 1990s that policy makers started to take crew relations seriously. The 1989 Kegworth air crash was instrumental here. As noted in the introduction of this chapter, it transpired after the Kegworth crash that the cabin crew had known which engine was on fire, but had not communicated this information to the aircraft's flight deck crew.[128] The AAIB report following the incident concluded that, 'had some initiative been taken by one or more of the cabin crew who had seen the distress of the left engine', the 'accident could have been prevented'.[129] The message was clear: crew relations were essential to flight safety. Following the recommendations of the AAIB, the CAA mandated that first flight deck crew, and then from 1995 all crew members, should receive annual CRM training.

British CRM training was based initially on the American model. Influenced by the 1979 National Aeronautics and Space Administration (NASA) workshop, 'Resource Management on the Flight Deck' and Ruffell Smith's simulator study carried out in the same year, American CRM training focused on the social environment of the cockpit.[130] It was concerned,

[128] Flin, O'Connor and Mearns, 'Crew Resource Management'.
[129] Air Accidents Investigation Branch, *Report on the accident to Boeing 737-400 G-OBME,* p. 106.
[130] H. P. Ruffell Smith, *A Simulator Study of the Interaction of Pilot Workload with Errors, Vigilance, and Decisions*, NASA Technical Memorandum 78482, January 1979, p. 35, available at:

principally, with the 'problem of the macho pilot', and, in particular, the effect of the captain on the social atmosphere and working conditions within the cockpit.[131] Training exercises focused primarily on teaching captains basic psychology and interpersonal skills. For example, in American Airlines as part of the upgrade programme completed prior to captaincy, pilots were required to undertake training on a basic psychoanalytic theory – transactional analysis – as it related to their job role.[132] The purpose of this training was to make new captains 'a little more aware of how they might operate in transacting or dealing with people' in the cockpit.[133]

Following this model, British CRM training initially focused on individual psychology. As Gerard Hunt, one of a small group of people involved in the development of British CRM courses, recalled, early iterations of CRM in Britain focussed largely on the identification of personal traits and temperament using psychoanalytic models of personality. The Myers-Briggs Type Indicator, an introspective questionnaire designed to indicate how people perceive the world and make decisions, was widely used.[134]

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http://www.picma.org.uk/sites/default/files/Documents/Background/NASA%201979%20sim%20study%20crew%20errors.pdf [last accessed 6 April 2017].

[131] Robert L. Helmreich, 'Sociology Psychology on the Flight Deck' in George E. Cooper, Maurice D. White, and John K. Lauber (eds.), *Resource Management on the Flight Deck: Proceedings of a NASA/Industry Workshop held at San Francisco, California June 26-28, 1979*, NASA Conference Publication 2120, March 1980, pp. 17-30, p. 22, available at: https://ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/19800013796.pdf [last accessed 6 April 2017].

[132] W. W. Estridge and J. L. Mansfield, 'Upgrade and Interpersonal Skills Training at American Airlines' in George E. Cooper, Maurice D. White, and John K. Lauber (eds.), *Resource Management on the Flight Deck: Proceedings of a NASA/Industry Workshop held at San Francisco, California June 26-28, 1979*, NASA Conference Publication 2120, March 1980, pp. 87-96, available at: https://ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/19800013796.pdf [last accessed 6 April 2017].

[133] Ibid. p. 93.

[134] Interview with Gerard Hunt, 8 February 2017.

From 1995, though, CRM training in Britain increasingly adopted a 'systematic approach to safety'.[135] As Gerard Hunt recalled, the movement from a personality-focused to a systems-based approach happened organically:

> One day one of our number, [who had a] psychology degree … found Jim Reason's work, and he came and gave us some printed things about organisational accidents and that was a complete game changer.[136]

Professor of Psychology at the University of Manchester, James Reason argued in *Human Error*, first published in 1990, that humans are fallible and errors are to be expected, even in the best organisations.[137] Errors, he argued, were consequences, not causes. Blunders occurred not as a result of the perversity of human nature, but, often, because of wider institutional and cultural factors. For Reason, then, systemic risk management was more important than the assignment of individual responsibility or blame. This approach fundamentally affected the design and implementation of countermeasures to unsafe practices. Rather than disciplinary or legal action, aimed at the punishment of individual shortcomings, the systems approach called for detailed analysis of processes and structures within a given organisation. In basic terms, then, this meant the identification of 'weaknesses' in organisational systems. As Reason put it a decade later:

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[135] Ibid.
[136] Ibid.
[137] James Reason, *Error Management*, (New York: Cambridge University Press, 1990).

> Countermeasures are based on the assumption that though we cannot change the human condition we can change the conditions under which humans work. A central idea is that of system defences. All hazardous technologies possess barriers and safeguards. When an adverse event occurs, the important issue is not who blundered, but how and why defences failed.[138]

For Reason, safeguards were central to the systems approach. While some defences could be engineered, others relied on people.

From the mid-1990s, British CRM training was predicated on this approach. The argument held that good interpersonal relations were central to flight safety. Much of the training provided by CRM, then, focussed on mitigating the cultural and social problems common to civil aviation. Particular attention was paid to levelling the steep status gradient between captains and other crew members. Flight deck and cabin crew were trained in communication and team work. The focus was less on individual performance, as in the earliest iterations of CRM, and more on the behaviours of the flight deck and cabin crew as a cohesive whole.

At the turn of the century, CRM was increasingly introduced to other workplace settings. In 2000 occupational psychologist Robert Helmerich (1937-2012) advocated its employment in health settings. Flight crews and medical practitioners faced, Helmrich argued, 'common interpersonal problem areas'.[139] This included, particularly, difficulties communicating with people from different specialties and of different occupational statuses. In aviation,

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[138] James Reason, 'Human Error: Models and Management', *British Medical Journal*, 320, 7237 (2000) 768-770, p. 769; Ibid. p. 768.
[139] Robert L. Helmreich, 'On Error Management: Lessons from Aviation', *British Medical Journal*, 320, 7237, (2000) 781-785, p. 783.

poor communication between the cabin and the cockpit could prove disastrous, as in the case of the 1989 Kegworth air crash. In a medical setting miscommunication and the failure of colleagues to speak out against unsafe practices could have equally tragic consequences. Helmreich referred to an instance of a fatigued anaesthetist who slept intermittently throughout a surgery and committed a number of errors as a result. Consequently, a healthy child died. Helmreich cited both the 'pressure to perform when fatigued' and the failure of nurses and surgeons to speak up as the key causes of this patient death.[140]

Though some National Health Service (NHS) trusts were receptive to Helmreich's argument, many medical practitioners were not. As Jeremy Butler, general manager of flight training at British Airways (BA) and later member of the NHS Research and Ethics Committee, noted:

> The medical profession will not do anything without evidence … In aviation, I fear that we have not gathered in sufficient detail or depth the evidence for human factors [and] CRM interventions as a necessary component in improving safety. I introduced CRM to BA on an instinctive feel, after attending conferences and seminars in … [America], but with very little research or analysis and no idea of how to measure outcomes of safety improvement … All this preamble is to say that we, involved in aviation human factors, have been remiss in not acquiring and documenting the evidence that HF [human factors] and CRM have improved aviation safety. We should have been measuring the effects of our interventions, doing genuine research and writing learned articles in *Aerospace* for years, but we haven't.[141]

[140] Ibid. p. 784.
[141] Jeremy Butler cited in Patrick Mitchell, *Safer Care: Human Factors for Healthcare Trainer's Manual,* (Argyll and Bute: Swan and Horn, 2013), p. viii.

This intuitive approach to policy and intervention was not specific to the aviation industry. The broadening acceptance of evidence based medicine in healthcare circles, however, called for more measured methodology and application. CRM could not provide this.

The skills taught in CRM training sessions were not necessarily new to everyone. As CRM trainer Gerard Hunt recounted, some of the crew members he worked with prior to the introduction of CRM training in the 1990s were 'were fantastic at CRM although they'd never heard about it', they had an 'intuitive way of doing things', of 'managing people' and 'being leaders' without ever needing to be taught.[142] The introduction of formal CRM training in the 1990s, however, marked a turning point in British regulatory policy. Non-technical skills training covered a broad range of issues, including assertiveness, situation awareness, and fatigue management. Fatigue, then, was subsumed within a broader rubric: human factors. Though fatigue had been considered alongside other human factors under the auspices of CHIRP since 1982, it was the only issue deemed worthy of regulation by the CAA until 1993. Fatigue continued to be controlled by specific regulations throughout the late twentieth and early twenty-first centuries but its inclusion in CRM training undermined its previously unique position in civil aviation. While concerns about fatigue had dominated civil aviation throughout the century, the introduction of CRM prompted a reconceptualisation of the condition. It became considered as one of many factors important to flight safety; not, as previously, the single most important human factor. As such, fatigue was, from the mid-1990s, increasingly side-lined by regulatory

[142] Interview with Gerard Hunt, 8 February 2017.

agencies. Indeed, in 2016 formal responsibility for flight time limitations was transferred beyond the CAA, to the European Aviation Safety Agency. As in industry in the immediate post-war period, the special status afforded to fatigue was rescinded.

6
Conclusion

> Fatigability is a characteristic of all living things and its natural remedy is rest, and it is important to recognise that alternating periods of activity and rest are merely illustrations of the rhythmicity which pervades all life, as evidenced by the seasons of the year, the ebb and flow of the sea, the beat of the heart, and the states of asleep and awake.[1]

This is how James L. Birley (1884-1934) described fatigue in a lecture delivered at the Royal Air Force (RAF) Staff College on 1 March 1923. It was important to understand and mitigate the effects of fatigue, Birley told his audience, for the maintenance of morale and courage in fighting men. Mental health, Birley argued, 'depends on the presence of a state of equilibrium between instinctive tendencies and the forces by which they are controlled'. Fatigue was, he argued, 'the most frequent cause of weakening of the controlling forces'.[2] When fatigued or sleep deprived, combatants were liable to breakdown. As Chief Medical Officer to the RAF during the First World War, Birley observed the effects of fatigue first hand.[3] At the Battle of the Somme, otherwise healthy young airmen suffered nervous breakdowns in 'alarming

[1] J. L. Birley, 'Psychology of Courage', *The Lancet*, 201, 5199 (1923) 779-785, p. 784.
[2] Ibid. p. 784.
[3] Mark Jackson, 'Men and Women under Stress: Neuropsychiatric Models of Resilience during and after the Second World War' in Mark Jackson (ed.), *Stress in Post-War Britain, 1945-85*, (London: Pickering and Chatto, 2015), pp. 111-130.

proportions'.[4] It was in this context that the relationship between exhaustion and the mental and physical health of flyers became clear to Birley. There was, according to Birley, no easy prophylaxis or cure for flying fatigue. A combination of adequate rest and leave was the only demonstrably effective solution. The institution of 'short shifts … as in all other communities where industrial fatigue was to be expected' was, Birley argued, the only means of perceptibly reducing 'the *permanent* wastage from this cause'.[5] Drawing on a model of fatigue management popularised by the Health of Munitions Workers Committee (HMWC) and the Industrial Fatigue Research Board (IFRB) during and immediately after the First World War, Birley called for limitations on duty hours.

Concerns about flying fatigue intensified during the Second World War. As airpower became increasingly central to British military strategy, the health and efficiency of flyers was granted increasing importance by RAF medical advisers. Chapter Two has shown that the complex model of fatigue developed by interwar theorists of flying stress influenced later research. The Flying Personnel Research Committee (FPRC) attributed flying fatigue to a range of psychological, physiological, and environmental factors, as in Birley's assessment. It is worth noting, though, that a definitive medical model of fatigue was not developed in this period. In some circles fatigue was framed as the result of mental distress, while in others it was considered a primarily physiological phenomenon. Physiological and psychological markers of fatigue were, however, not agreed upon, though research in this area

[4] J. L. Birley, 'Goulstoninan Lectures on the Principles of Medical Science as Applied to Military Aviation: Lecture I', *The Lancet*, 195, 5048 (1920) 1147-1151, p. 1147.
[5] Ibid. p. 1151.

continued long into the post-war period. Fatigue, instead, came to be viewed in functional terms. FPRC researchers were in agreement that fatigue caused operational inefficiency. Evidence from simulator tests and operational flight suggested that this often resulted in human error and 'accident proneness'.[6]

After the war flying fatigue became somewhat divorced from medical and scientific discourses, but the assumption that it had implications for flight safety remained. For most of the century flying fatigue was conceptualised in the functional terms popularised during World War Two. In line with the presentation of fatigue in other transport sectors, it was deemed a potential hazard to workers and publics. Air crashes acted as trigger points here. The scale of human hurt in air crashes prompted serious consideration of aircrew fatigue by regulatory bodies. Indeed, flight safety was cited as the justification for the regulation of aircrew schedules by industry regulators and trade unions throughout the twentieth century. As Chapter Three demonstrated though, concerns about safety did not entirely dominate regulatory debate in the twentieth century. As in the regulation of health and safety hazards more broadly, commercial and administrative interests loomed large throughout the period.

Pay was also a central concern for trade unions in the middle twentieth century. In the nineteenth and early twentieth centuries, industrial fatigue was framed primarily in productivist terms. As Chapter Four demonstrates, trade unions drew on and exploited this discourse in campaigns for improved pay in the 1960s. Later in the century though, unions reframed discussions of

[6] TNA AIR 57/10: Squadron Leader D. D. Reid, 'FPRC Report 508: The Influence of Psychological Disorder on Efficiency in Operational Flying', September 1942, p. 11.

working hours and fatigue in terms of safety. It was in this context that the most compelling – and, frankly, frightening – manifestation of fatigue, as sleep, saw cultural expression in the post-war period.

Complex and indefinite, fatigue was contested throughout the century. The initial tensions present in Birley's assessment remained. Fatigue was, at once, psychological and physiological in nature and cause. While a number of attempts were made to clearly determine the aetiology and somatic expression of fatigue in the laboratory, scientific and medical consensus was not reached in the twentieth century. Throughout the century researchers and regulators relied, instead, on self-report and expert testimony. Unlike industrial fatigue management in the early twentieth century, science and medicine were not central to state or airline policy. Though there remained a tacit recognition that fatigue had psychological and physiological causes and expressions, most discussion of aircrew fatigue centred on the structural and environmental issues identified as important by trade unions. Hours of work and rest were central here.

It was in this context that debates about responsibility for and of publics were played out. A central tension existed, as in broader post-war regulatory discourse, between the apparent responsibility of individuals to adequately prepare for and use rest periods, and the responsibilities of employers and the state to facilitate this. Though debate about hours of work and rest dominated regulatory and trade union discourses this did not entirely reflect the lived experiences of aircrew. As Chapter Five has shown, there was a dissonance between official and quotidian understandings of fatigue. Flight deck crew and cabin attendants consistently attributed the cause of fatigue elsewhere. Oral

history narratives focused on the length of commutes, sleeping difficulties, and the effect of circadian dysrhythmia induced by rapid time changes.

In certain occupational contexts, then, fatigue continued to structure debates about work, wellbeing, and responsibility into the late twentieth century. While the language of stress came to dominate discussions of mental and physical malaise in the workplace more broadly, fatigue remained the dominant discourse in safety critical industries. In the post-war period, fatigue continued to frame discussions about the relationship between working environments and the health and wellbeing of workers in civil aviation. This is not to say that models of fatigue were unaffected by the growth of stress research. The hormonal accounts of mental distress popularised by stress researchers in the post-war period structured research on flying fatigue into the middle and late twentieth century. As Chapter Two demonstrates, however, unlike stress, biochemical markers for fatigue were difficult to pin down. As such, medical models of fatigue continued to use performance as an indicator of mental and physical distress. Unlike stress, then, fatigue had no clear psychophysiological basis. It remained, instead, vague and contested throughout the century.

Scientific and medical uncertainty about the causes and consequences of fatigue allowed it to be mobilised in a variety of ways, as described above. Workers, trade unions, airlines, and regulators drew on different models of fatigue to serve different purposes. In some instances, fatigue was framed in emotional terms. Drawing on the psychological model of fatigue and flying stress popularised by Charles Symonds (1890-1978) and Denis J. Williams during wartime, in the 1960s Hugh Patrick Ruffell Smith (1911-1980) argued

that strained interpersonal relations were a source of fatigue for many. Framing fatigue as a result of psychological and emotional distress, Ruffell Smith called for airline managers to improve relations with crew members. A decade later, trade unions framed fatigue in physiological terns, as a result of sleep loss and circadian disruption. In this context, fatigue was reimagined in its most terrifying incarnation – as sleep – to bolster union calls for the introduction of health and safety legislation. Throughout the century, though, a functional model of fatigue remained dominant. As in the nineteenth and early-twentieth century, fatigue was measured in terms of its effect on performance. In this discourse the biological body, as well as the emotional health of workers, was kept at a distance. Fatigue was, instead, framed in abstract statistical terms. It was, at its core, a diminished capacity for work, as it had been since the nineteenth century. In many ways, then, this is a history of continuity rather than change. Though new concerns were attached to performance decrement in safety critical workplaces, the essential model of fatigue was unchanged.

There are several ways in which future research can build on the work begun in this thesis. Undoubtedly, a broader history of workplace fatigue would be useful not only for historians of occupational health and disease, but also for those interested in discourses of productivity and safety. As this thesis has shown, civil aviation provides but one example of how workplace fatigue was configured and managed in the twentieth century. Examination of fatigue in different safety critical industries would shed light on whether the conclusions reached here are specific to the aviation industry, or whether, perhaps, they are representative of broader trends. Similarly, expanding the

geographical scope of this research beyond Britain would shed light on whether the research and policies discussed here are distinctively British or, given the international nature of the aviation industry, they are representative of global trends. Many of the actors described were not confined to a single national context. Following his employment by the FPRC Ruffell Smith, for example, worked with the National Aeronautics and Space Administration (NASA) on issues relating to human factors and interpersonal relations. An actor-network analysis or comparative history of Britain and the United States may, then, shed light on the international implications of British flying fatigue research.

Given the on-going unrest related to the introduction of new junior doctors' contracts, an exploration of the history of fatigue, organisational culture and practices, and the regulation of work and rest in the NHS is particularly pertinent. 2016 saw a record level of industrial action by junior doctors in response to government plans to introduce a new contract that reclassified doctors' normal working hours. The British Medical Association (BMA) framed its criticism of the contract in terms of patient safety. The new contract, the Association argued, would increase doctors' working hours and intensify their workload, causing fatigue and burnout. This, the BMA suggested, had implications for patient care. The Association failed to convince Health Secretary Jeremy Hunt of this, however, and in October 2016 the first group of junior doctors in England started work under the terms and conditions of the new contract. While further industrial action has been suspended, the BMA remains opposed to the new contract.

By examining the historical roots of the current conflict, and by comparing this with civil aviation, possibilities for compromise and agreement may emerge. Similarities between civil aviation and medical practice were consistently drawn in the middle and late twentieth century. The occupations were said to share a similar professional culture, and to engage in comparable working practices. Hospitals, like airports, never close and, as such, healthcare providers and aircrew operate under a distinctive but shared set of circumstances. Long and intensive shifts are common. Sleep deprivation and fatigue are widespread as a result. Responsibility and risk permeate both professions. Though, as this thesis has described, these comparisons were drawn out by a number of contemporary commentators, no in-depth history of fatigue in the NHS has been written. Today doctors and nurses increasingly seek support for work-related illness and burnout from services like the NHS Practitioner Health Programme.[7] Scholarship that critically examines the structural and organisational causes and consequences of fatigue in the NHS is, then, not only intellectually, but also politically, important.

[7] NHS Practitioner Health Programme is a confidential NHS treatment service for doctors and dentists, see: http://php.nhs.uk [last accessed 18 July 2017].

Appendix

Oral History Respondents

Name	Born	Occupation	Interview
Albert Watson	1957	Pilot	5 January 2017
Andrew Murray	1954	Pilot	4 March 2016
Charles Green	1946	Cabin Crew	21 November 2016
Elizabeth Powell	1944	Cabin Crew	30 January 2017
Gerard Hunt	1951	Pilot	8 February 2017
Isaac Shaw	1944	Cabin Crew	26 January 2017
Jacob Evans	1941	Cabin Crew	28 November 2016
James Hall	1937	RAF/Navigator/Pilot	30 March 2016
Jeffrey Cooper	1939	Flight Engineer	24 January 2017
Julia Evans	1950	Cabin Crew	28 November 2016
Matthew Hart	1946	Cabin Crew	26 January 2017
Patrick Smith	1947	Cabin Crew	3 February 2017
Paul White	1931	RAF/Pilot/CHIRP	17 March 2016
Philip Gray	1947	Pilot	26 January 2017
Rose Green	1949	Cabin Crew	21 November 2016
Stephen Harris	1969	Cabin Crew	7 December 2016

Pseudonyms have been used in all cases to protect the anonymity of interviewees and to safeguard the anonymity of the people and places mentioned in the interviews.

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AIR Air Ministry and Ministry of Defence

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AVIA Ministry of Aviation

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PSY/HAW Lionel Haward, 1952-1998

PSY/HAW/1/1, published and unpublished papers on aviation matters, 1965-1998.

WF/M/PL Wellcome Library Foundation Marketing Product Literature

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