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Mechanisms Behind Them

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# **Zeroed Down: The Effects of Zero-Hours Contracts on Mental Health and The Mechanisms Behind Them**

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## **Abstract**

This paper investigates the impacts of zero-hours contracts (ZHCs) on mental health and the factors behind this impact. Current ZHC research is lacking, and considering their rapid rise and harmful characteristics, there is cause for concern. 2018-2019 data from Understanding Society is used, and analysis finds a highly significant result that the mental health of zero-hours workers is, on average, 12.2% worse than other workers. Income insecurity and low job satisfaction are identified as mechanisms through which ZHCs harm wellbeing. This paper corroborates previous findings that ZHCs are detrimental to health and builds upon such research by identifying harmful attributes.

Keywords: zero-hours contract, mental health, job insecurity, job satisfaction, schedule insecurity, United Kingdom

JEL classification: I10, J41

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## **1. Introduction**

While there is no legal definition of zero-hours contracts (ZHCs), it is generally agreed that the term covers contracts which do not guarantee hours, of which workers are at no obligation to accept (Department for Business, Energy and Industrial Strategy, 2015). They are associated with low pay, income & hours insecurity, and underemployment (Koumenta and Williams, 2019). Because of the ambiguity surrounding its definition, estimates of ZHCs are also vague. Spring-Summer 2015 estimates of number of workers on ZHCs ranged from 746,000 (Office for National Statistics (ONS), 2021) to 1.3 million (Chartered Institute of Personnel Development (CIPD), 2015). The ONS estimate for the Q4 2020 is 978,000.

Regardless of the varying estimates, the prevalence of ZHCs has grown rapidly in the past decade, with ONS estimates alone increasing from 0.8% of the UK workforce in Q4 2012 to 3% in Q4 2020 (ONS, 2021). Due to this rapid growth, ZHCs have had vast media and political attention in recent years, attracting both critics and supporters. Critics highlight the potential harmful effects of such contracts, while supporters emphasise the benefits of their flexibility, and the role they have played in creating new employment and aiding the recovery from the financial crisis (Adams and Prassl, 2018). Meanwhile, there has been notably little academic research into ZHCs, both theoretically and empirically. The few studies in the literature typically find negative health impacts of ZHCs. This is not surprising; when exploited, they can have severe impacts on worker wellbeing.

This paper will attempt to estimate the effects of zero-hours contracts on mental health and identify ZHC-specific mechanisms through which it is affected. It will build upon current research into ZHCs on wellbeing using recent data and address a gap in the literature by identifying mechanisms based on theory and evidence. There has been no explicit empirical attempt within the literature to identify these ZHC mechanisms, only speculation and educated

guesses. It will use data from Understanding Society Wave 10 (2018-2019), a representative sample of the UK working population. Analysis is run on the full sample and a restricted sample (excluding full-time students).

The paper continues as follows. Section 2 offers a literature review, examining hypothesised relationships between ZHCs and mental health, and empirical evidence regarding ZHCs and mental health. Section 3 explains the data and methodology for the analyses. Section 4 presents the results and goes into more detail, removing full-time students from the sample. Section 5 concludes the paper.

## **2. Literature Review**

### **2.1 Theoretical framework**

This section will explore relevant theoretical frameworks which help explain how zero-hours contracts might harm mental health and then go onto suggest mechanisms behind these effects. Since they are still a relatively new phenomenon, there are no specific zero-hours frameworks. However, zero-hours contracts are a form of precarious employment (albeit an extreme one), which there is an abundance of literature on. Precarious employment refers to non-standard employment characterised by (but not exclusively) uncertainty and low wages (Benach et al., 2014). The frameworks discussed below, although not directly addressing them, can be applied to ZHCs.

The three theories discussed are thought to be the most applicable in terms of ZHCs. They are first explained, then adapted into the context of zero-hours work. After discussing the three frameworks, potential ZHC mechanisms are examined and discussed in greater detail.

#### **Precarious employment framework**

Tompa et al. (2007) propose a framework which both predicts and explains negative health effects of precarious employment. The authors use evidence from previous studies to suggest eight dimensions ('the Tompa mechanisms') associated with precarious work which impact health, and the pathways through which they do so.

Eight precarious dimensions are defined:

1. **Job security:** the degree of protection within one's job and more broadly their employment status within the labour market. It additionally represents the regularity and continuity of shifts.
2. **Control over work:** the level of control one has over their role. This covers factors such as workload, shift scheduling, task assignment, and the capability to refuse shifts.
3. **Legal protection:** the employment rights (eg protection from unfair dismissal) and union access of workers. It also covers the ease at which legal protection and information can be obtained.
4. **Earnings and benefits:** the adequacy of wages and the consistency of income. It also covers factors such as ability to take time off and accessibility to benefits, such as maternity/paternity leave.
5. **Status:** the level of perceived status ("prestige") associated with one's job, by both co-workers and society. Also considers the stigma of a contract type within an organisation.
6. **Work environment:** the availability of peer support within work, company culture and management style.
7. **Harmful exposure:** the level of risk of harmful exposure to hazards that the worker might face.
8. **Development opportunities:** the availability of various training and development opportunities, such as role-specific, health and safety, and general skill training.

There are three different pathways in which these dimensions lead to poor health: stress, material deprivation, and harmful exposure. Stress is experienced much more than deprivation or exposure, so it is named the primary pathway to ill health. Deprivation and exposure are secondary pathways since they are experienced less often. The pathways are not exclusive and can interact, for example, having little control over scheduling might lead to stress and also cause deprivation via being assigned fewer shifts and earning less money. There is no absolute effect of the dimensions and pathways: people experience them differently according to their personal characteristics and situations. The path taken is irrelevant in terms of health impact. The more frequently and in greater intensity one is exposed to these dimensions, the worse their health will be.

Stress is implied as a “derivative of insecurity” (p216), implying that the stress experienced is a result of job-related insecurity. As stress is the primary pathway, this therefore suggests that insecurity is the driving force of health impacts within precarious employment. Note here that job-related insecurity covers a range of factors, not just employment security.

Although focused on generalised precarious work, this framework is particularly relevant in terms of zero-hours contracts: almost all dimensions represent an issue applicable to zero-hours work. It is an intuitive framework which covers a wide range of aspects through which precarity can impact health. However, some of its dimensions (eg legal protection of workers) are reasonably unmeasurable if using typical surveys, as they will not go into this much detail. This might lead to estimation difficulties.

#### Job Demand Control Support model

One of the most prevalent theories in the employment-health literature is the job demand control support (JDACS) model. Originally the JDC model, proposed by Karasek Jr (1979), it focuses on job strain, a key determinant of poor health in employment. The model proposes

two hypotheses: the strain and the buffer hypothesis. The strain hypothesis predicts that high job demands (workload) and low job control (position) cause high job strain, which causes ill health. This is the main prediction of the model. Alternatively, the buffer hypothesis predicts that higher levels of job control can “buffer” against the detrimental impacts of high demands. Research into this model has shown that low control is a more important determinant of ill health than high demands (Marmot and Theorell, 1988).

Johnson and Hall (1988) and Johnson, Hall and Theorell (1989) extended Karasek Jr’s model to the JDCS model, adding a social dimension. Also introduced was the concept of iso-strain (high job strain combined with social isolation), replacing job strain as a determinant of ill health. The iso-strain hypothesis predicts that high demands, low control, and low support lead to iso-strain and so ill health. The (JDCS) buffer hypothesis predicts that social support acts as a mediator of strain.

The JDCS model does provide some insight into the health effects of employment. However, there are a variety of other factors to be considered within zero-hours contracts, other than demands and control, which are by default ignored in this model. ZHCs are a complex, multi-faceted working arrangement with a huge amount of variation in worker experience. While the control and demand factors have proved successful in explaining health in standard employment studies, ZHCs are a lot more variant in experience, and so the JDCS model is arguably not the best theory to use in the context of zero-hours contracts.

### Employment strain

Lewchuk et al. (2003) propose a framework focused on “employment strain”, an expansion of the JDC model’s concept of job strain. The employment strain model has a greater focus on precarious work since it is a fundamentally different type of employment which would not have been considered during the creation of the original model. It captures the various dimensions

of uncertainty associated with precarious work. These factors contribute to employment strain, which results in greater stress and poor work-life balance, leading to poor social support and, ultimately, ill health.

All strain dimensions are related to uncertainty and the level of control the worker has over the respective factor.

1. **Employment uncertainty:** the control one has over the continuation of their employment.
2. **Schedule uncertainty:** level of control over scheduled work hours.
3. **Income uncertainty:** level of control over regularity of future income.
4. **Household uncertainty:** level of control over providing for basic needs.
5. **Location uncertainty:** level of control over their location of work.
6. **Duties uncertainty:** level of control over the tasks one performs/level of workload.
7. **Employment uncertainty workload:** level of control over managing the uncertainty of employment (eg time spent job searching or strain from having two jobs).

This model could be applied to ZHCs as they generally focus on greater uncertainty. However, in comparison to the Tompa framework, it is relatively weak in its mechanisms, and some are particularly niche, for example, the level of control workers have over their employment uncertainty workload or their location. These are weak dimensions which quite likely concern only a very small proportion of workers. The model is simply less applicable to ZHCs. Like the JDCS model, its weakness is its relatively one-sided focus on insecurity and its ignorance to other factors.

Ultimately, the framework put forward by Tompa et al. (2007) seems to be the best suited to answering the research questions. It is the strongest in explaining the health impacts of ZHCs and its dimensions correspond well to zero-hours characteristics. Because of this, the proposed

dimensions are used as the basis for the potential mechanisms in the analysis. Although the Tompa model is the strongest, the other two models also contribute different and important ideas which are used further in this paper (eg greater focus on job control or insecurity). It should be noted that while all three theories suggest different ways in “achieving” poor health, they are all centred around (to varying extents) the role of work-based stress in causing it.

### Proposed mechanisms

In this subsection, mechanisms suggested by the theory are explored and expanded upon. The mechanisms chosen to be discussed are those that are most convincing in terms of zero-hours contracts or have the most research behind them. Other mechanisms will be analysed (as discussed in the methodology), but due to the limited scope of this paper, only the most convincing will be expanded upon. It should be remembered, though, that all Tompa mechanisms suggested were based on evidence of them being both more prevalent in precarious work and a detriment to health.

There are three broad types of employment insecurity: job, schedule, and income insecurity. They are all in some form connected, but there is an attempt here to separate them into their individual components.

#### *Job insecurity*

Greenhalgh and Rosenblatt (1984) define job insecurity as concern arising from uncertainty over the future of employment. Job insecurity is one of the most frequently suggested mechanisms of ill health in ZHCs, in both the theoretical and the empirical literature. There are more potential sources of job insecurity in ZHCs, such as fewer worker rights and manager-employee power imbalances, which might make staff appear more expendable. Green and Leeves (2013) acknowledge the previous literature finding that those on flexible contracts are

more prone to insecurity. Using Australian data, they find that flexible workers are exposed to greater levels of job (and income) insecurity, which harms wellbeing.

In his seminal paper, De Witte (1999) not only finds job insecurity to harm wellbeing, but that it is one of the most significant employment-related stressors. Insecure workers have similar mental health scores to those in short-term unemployment. Similarly, Burchell (2011) finds increases in job insecurity to lead to worse mental health. Persistent feelings of job insecurity result in greater stress and thus poor health, indicating that a worker's resilience to insecurity diminishes as time goes on.

While job insecurity has been shown to impact health, it should be questioned whether it is a ZHC-specific mechanism. As mentioned above, the theory and the literature suggest that it is. However, the theory is not ZHC-specific, and the use of job insecurity in the literature is inconsistent, often being used as an umbrella term to represent all job-related insecurities. Additionally, job insecurity is an employment-wide phenomenon: all four insecurity studies discussed above were written before ZHCs were in common use. It does not seem that job insecurity is specific to zero-hours contracts in the way that, for example, schedule insecurity is. This puts into question whether it is a ZHC-specific mechanism.

### *Schedule insecurity*

Schedule insecurity is uncertainty arising from any aspect of a worker's schedule. It is arguably the biggest source of insecurity in zero-hours work, resulting primarily from unpredictable shifts and zeroing down (discussed below). Schedule insecurity is relatively unique in the context of ZHCs. While other flexible jobs may experience some degree of it, ZHCs are, by definition, much more prone to schedule uncertainty (no guaranteed hours). A Trades Union Congress ((TUC), 2017) survey finds that 66% of U.K. zero-hours workers want more shift regularity.

Most zero-hours workers are subject to unpredictable shifts. They often receive their hours weekly, may not have a regular schedule, and have shifts changed on short notice (51% of zero-hours workers have had shifts cancelled with less than 24 hours' notice (TUC, 2017). This unpredictability means that workers are generally unable to plan ahead more than one week in advance (aside from requested time off). Unpredictable shifts can cause a great deal of stress for workers, which leads to worse health.

Wood and Burchell (2014) conclude that schedule insecurity is highly prevalent within zero-hours jobs. Frequent changes cause instability and leave workers feeling anxious and stressed about unexpected changes to schedules, and therefore income. This results in worse work-life balance and so poorer wellbeing. Other than health, the authors find consequences of schedule insecurity such as less opportunity for training programs and strain on personal relationships, both due to reduced free time resulting from the unpredictability of shifts.

Henly and Lambert (2014) show that greater schedule insecurity – specifically hours changing at short notice – leads to greater work-life conflict and thus stress. It is suggested that the greater schedule insecurity, as well as uncertain income and low job control, leads to this greater stress, which leads to poor wellbeing. Somewhat positively, Felstead et al. (2020) find that the negative impacts can be reduced if workers are given greater control over their schedules.

Aside from unpredictable shifts, a significant component of schedule insecurity somewhat unique to ZHCs is “zeroing down”. Zeroing down occurs when employees are punished for turning down shifts, in some cases leading to shifts being chronically reduced until staff are on very low hours. Although unethical, this is very common: TUC (2017) finds that 35% of their zero-hours sample have been threatened with zeroing down and a CIPD (2013) survey finds that 20% of U.K. ZHC workers are punished if they do not accept certain shifts.

This understandably puts greater strain on staff: 60% of zero-hours workers feel as if they are obliged to accept shifts (United Kingdom Commission for Employment and Skills (UKCES), 2014). Adams and Prassl (2018) discuss how fear of zeroing down can lead to working erratic hours and in fact reduce workers' levels of flexibility outside of work. Staff exposed to schedule insecurity tend to have worse work-life balance, where their job may take an unhealthy priority in their life. This puts strain on relationships and down-time, ultimately leading to worse wellbeing.

### *Income insecurity*

Income insecurity essentially represents financial worry. It can be a by-product of insecurity or can come about simply through low wages. Scheduling uncertainty gives rise to income insecurity if the worker is subject to unpredictable shifts, thus not guaranteeing a stable income. Job insecurity can also give rise to it, but that is in the more extreme case of losing complete income. Low wages lead to income insecurity as with less money, workers become more financially anxious.

One way in which ZHCs contribute to greater income insecurity is through inconsistent earnings arising from inconsistent schedules. Workers become concerned about earning a stable income, as instability can lead to difficulties in financial planning: 57% on ZHCs find it difficult to budget monthly (UKCES, 2014). Due to unstable and infrequent income, zero-hours workers can additionally struggle to secure credit: some banks do not acknowledge ZHCs as a primary form of income (Adams and Prassl, 2018).

Avram (2020) uses an experimental methodology to study the impacts of income insecurity arising from schedule insecurity. The methodology helps mitigate potential endogeneity and measurement issues (surveys may have a negative bias within their questions). The experimental sample consisted of low-income employees and excluded undergraduate students

to make it more representative of those who would experience the effects of ZHCs more significantly. The experiment shows that schedule insecurity led to lower expected pay, which is harmful to workers. Subjects were shown to avoid uncertainty, even when it is financially disadvantageous to do so. Additionally, it is likely that these effects found are underestimated: experiments are isolated hypothetical events which will fail to fully represent the situation they try to recreate. The paper concludes by arguing that income insecurity associated with zero-hours contracts hurts workers.

The prevalence of income insecurity is exacerbated by low wages in zero-hours employment. Datta, Giupponi and Machin (2019) find that the median pay of a zero-hours worker in the United Kingdom in 2017 was within 5% of the minimum wage. This low pay, alongside scheduling issues, leads to significant income insecurity – especially for workers who do not have any other options than to work on that contract.

There is a relatively well-founded link between financial anxieties and poor mental health. Bridges and Disney (2010) show an association between greater financial stress and mental ill-health in the U.K. Similarly, Rhode et al. (2016) find that a range of factors associated with income insecurity (income dissatisfaction, lack of access to emergency funds, earnings volatility) has significant detrimental impacts on mental health. This result is particularly important in terms of ZHCs as it concerns exact components of income insecurity which zero-hours workers are exposed to.

#### *Low control*

There is a lot of variation in the definition of the term “job control”. In this paper, job control is based upon the definition from Tompa et al., representing control associated with job role, eg level of responsibility, workload, independence, and access to resources. It does not concern schedules, as that is focused on elsewhere.

Zero-hours work is often concentrated in lower-skilled sectors and jobs. Both Campbell (2019) and Lavery (2014) associate zero-hours contracts with low-skilled work. Low-skilled jobs are associated with lower levels of responsibility and thus generally lower levels of control. Therefore, zero-hours contracts are more likely to be concentrated in lower-control jobs.

Moreover, Wood, Burchell and Coutts (2016) highlight the (often) skewed levels of management-employee control within ZHC workplaces in the United Kingdom. Workers may feel as if they cannot raise issues regarding working rights or workplace problems due to this power imbalance and feelings of intimidation. The fear of zeroing down is a prime example of the potential power imbalance within zero-hours work.

Related to the legal protection dimension, what might exacerbate control issues further is the employment rights of ZHCs. Those on U.K. ZHCs can be classified either as employees or workers. CIPD (2013) found that 19% of their U.K. zero-hours sample were classed as workers, and employers did not know what 7% were classed as, which is highly concerning, considering the differing implications of worker/employee classification. All workers are not entitled to a range of employment rights, such as unfair dismissal and maternity/paternity leave (Department for Business Innovation and Skills, 2013). This can strip away protection associated with jobs and put workers in a position of lower control. It can also contribute to a greater imbalance of power between management and employees.

Low work control has been both theorised and empirically shown to negatively impact on workers' health (Karasek Jr, 1979; Bosma et al., 1997). Dalgard et al. (2009) find that low job control (based on independence and relative skill use) is associated with significant psychological distress.

### *Job (dis)satisfaction*

Job insecurity appears to be linked to low job satisfaction (De Witte, 1999). In the context of ZHCs, it could be that all forms of insecurity contribute to greater job dissatisfaction, implying that zero-hours workers are more prone to low job satisfaction. It is thought that (low) job satisfaction might also capture other work-related aspects of ZHCs, such as poor career progression or working environment. De Witte, Vander Elst and De Cuyper (2015) discuss a relatively strong link between job insecurity, job dissatisfaction and mental health, and Vander Elst et al. (2011) demonstrate a relationship between the same three factors. Additionally, low job satisfaction has been associated with poor mental health (Nadinloyi, Sadeghi and Haljoo 2013).

## **2.2 Zero-Hours/Precarious Employment Empirical Literature**

Firstly, this section looks at previous studies on the impacts of zero-hours employment, and secondly expands the search into precarious employment studies.

### Impacts of zero-hours contracts

The academic literature surrounding zero-hours contracts and their effects is sparse. Ravailer et al. (2017) highlight that at time of writing, there are no peer-reviewed articles investigating the effects of ZHCs. Four years later, there are now two.

Farina, Green and McVicar (2020a) study the effects of ZHCs on physical and mental health using Labour Force Survey data. An instrumental variable for ZHC status is used to avoid potential endogeneity (if there is non-random selection into flexible employment). Compared to permanent non-ZHCs, they find that zero-hours workers are up to 12% more likely to have a long-lasting health condition and up to 40% more likely to report a mental health condition.

Henderson (2019) evaluates the impacts of ZHCs on the mental health of 25-year-olds in the United Kingdom, finding that those on zero-hours work are at a 44% greater risk of mental health problems compared to other workers. The paper benefits from its sample: while it is restricted age-wise, it is diverse in other aspects, such as race, and so it is much more representative. One advantage of using 25-year-olds is that most students will be removed from the sample, thus potentially giving more accurate estimates of the impacts of ZHCs on workers. It is expected that students will be less reliant on their jobs, and so the negative aspects of ZHCs may be less relevant to them.

Additionally, Thorley and Cook (2017) find that those on ZHCs in the U.K. are 13 percentage points more likely to have poor mental health than those in other jobs. They argue that ZHCs have a causal impact on poor wellbeing. Ravailer et al. (2017) also find that care workers in zero-hours work have worse mental health than other workers. However, they fail to find a statistically significant effect of ZHCs on mental health. Considering the consistent findings above, the failure to find a significant effect is more likely due to study limitations, such as their small sample size ( $n = 199$ ), than an absence of a ZHC-health effect.

Zero-hours workers are exposed to more employment-related stressors, according to research by Ravailer et al. (2019). Such stressors include insecurity (and its impacts on work-life balance) and poor management-employee power relationships. This greater stress in turn impacts health. The link between stress and ill health is well-established, being empirically validated numerous times. For example, Chandola, Brunner, and Marmot (2006) establish a strong link between stress and greater incidence of ill health, and Melchior et al. (2007) show that stress can lead to greater incidence of anxiety and depression. While stress is an important mediating factor in the theorised relationship, it is not explored much further in this paper.

## Impacts of precarious employment

Since zero-hours contracts are a form of precarious employment, this section will focus on precarious employment studies. While they have similar characteristics, it must be remembered that effects found in precarious employment will not directly translate to ZHCs, but should give a general indication of effects.

Lewchuk, Clarke and Wolff (2008) use Canadian data to investigate the health impacts of non-permanent work. Students are excluded from their sample, as it is argued that they experience the effects of employment differently. Significant associations are found between schedule insecurity & poor health, and low social support & poor health. The relationships between income insecurity & health, and job uncertainty & health, however, are insignificant. They conclude by proposing that it is the employment characteristics that are associated with poor health, rather than the specific employment type.

Scott-Marshall and Tompa (2011) find that certain factors associated with precarious employment (low wages, financial benefits inadequacies, and manual work) contribute to poor health. However, they fail to find a significant effect of precarious employment (temporary jobs) as a whole on health. This is potentially because of the paper's focus on physical health: they highlight that work stressors impact mental health faster and in more intensity than physical health. Significant effects therefore might have been missed.

Kachi, Otsuka and Kawada (2014) look at effects of job precarity on mental health in Japan. They address the bidirectional relationship, where precarious employment may impact mental health, but also where workers of poorer health may choose to work in precarious jobs. This is accounted for by using longitudinal data. It is found that in men, precarious work (part-time or contract) is significantly associated with serious psychological distress. No significant effect was found in women. They propose that this might be due to "traditional Japanese gender roles"

(where men are typically seen as the breadwinners, and women the homemakers) as there may be greater pressure/responsibility associated with men's jobs. They suggest that low income, job insecurity, and poor conditions may be key factors associated with precarious work causing ill health.

The literature and theory are relatively consistent in their findings of the harmful health impacts of ZHCs, and are slightly more diverse when it comes to suggesting the mechanisms behind these impacts. In the context of zero-hours contracts, schedule and income insecurity are the most convincing as they are most uniquely prevalent within this type of work. They are discussed in arguably stronger studies with less conflict between papers. Moreover, it is relatively expected that job control and job satisfaction are ZHC-specific mechanisms. It seems that zero-hours workers are more highly concentrated in lower-control jobs and it is expected that they experience lower job satisfaction, both of which have been shown to harm health. As discussed, it is questioned whether job insecurity is a ZHC-specific, or an employment-wide issue, thus questioning whether it is an applicable mechanism within this study.

While existing papers have previously looked into the impacts of ZHCs on health, this paper is unique in the sense that it both proposes and investigates mechanisms behind these health effects. No other research paper currently has examined what it is specifically about ZHCs which make them detrimental to health.

### **3. Data and Methodology**

#### **3.1 Dataset**

The data is taken from Wave 10 (2018 – 2019) of the Understanding Society (USoc) survey. This is a yearly survey, covering a range of issues such as employment, education, and health in the United Kingdom.

The sample represents the UK working population. Those not in employment (and invalid responses) are removed from the sample, reducing the sample size from 34,318 to 12,886 individuals.

## Variables

### *General Health Questionnaire*

The outcome variable is worker wellbeing/mental health, as measured by General Health Questionnaire (GHQ-12) score. The GHQ is a self-complete questionnaire focusing on health and wellbeing over the past four weeks and can be used to identify recent minor mental health issues. Responses are given on a four-point scale ranging from “more so” to “much less so” (or their equivalent). The scores measure on a scale of 0 to 36, where 0 represents the least distressed and 36 the most distressed. The 12-question format is most widely used in employment research (Goldberg et al., 1997).

A potential concern arises from the fact that the GHQ is a self-report measure: self-report answers can introduce measurement error. It is not guaranteed that everyone will interpret the questions the same way, or that everyone is working from the same ‘baseline’. However, since the answers are essentially symmetric, extreme reactions (exaggeration or downplaying) should be cancelled out by one another. If there is measurement error, it would likely only affect the precision of estimates, rather than their direction.

The GHQ has been shown to be a reliable measure of mental distress, with a focus on depressive symptoms, but low association with anxiety (Romppel et al., 2013). It is chosen as the outcome variable as it will likely show impacts of poor employment contracts. Due to its short-term focus, it may miss more serious or longer-term issues. It might also inadequately identify anxiety-related problems, which could result in underestimation of ZHC-wellbeing issues.

Since the GHQ focuses on mental wellbeing, this dissertation does not focus on the physical health impacts of zero-hours contracts. As previously mentioned, it is much more likely that the effects of ZHCs will be found in mental health than physical health.

### *Zero-hours contracts*

The variable of focus is ZHC working status. USoc asks a range of employment questions, including employment status and contract type. Those who are employed are asked whether their job offers any flexible working arrangements from a given list. If so, they are further asked whether they are employed on any such arrangements, one of which being a ZHC. Other flexible arrangements include part-time, working from home and on-call working.

273 entries were lost due to a USoc routing error with the flexible work question. The error occurred where some respondents whose work offered ZHCs were not asked whether they were employed on a ZHC. It is likely that these missing respondents were ZHC workers, and thus are missing from this sample, potentially introducing bias.

ZHC workers correspond to 1.94% of the working sample. Although estimates of zero-hours workers in the UK vary significantly, the average estimated value over the 2018-2019 period is 2.7% of the working population (ONS, 2021).

### *ZHC mechanisms*

Of secondary focus are the proposed ZHC dimensions, largely based on the Tompa framework. The mechanisms are chosen because they are most relevant to zero-hours work and are believed to impact wellbeing. They are job insecurity, schedule insecurity, income insecurity, job control, legal protection, status, training opportunities, and job satisfaction.

Schedule insecurity is taken out into a separate mechanism because zero-hours workers are arguably exposed to it more than any other mechanism. It was originally split between two mechanisms in the Tompa framework, so this simplifies matters. Job satisfaction is singled out

too because it is expected that ZHC workers will be more dissatisfied with their job. If a worker has an issue with their job – or contract type – the effects will likely be shown here.

Proxy variables are used for mechanisms which do not have an obvious corresponding variable in the dataset. Where otherwise explicit, job control is represented by managerial duties, protection by union membership, schedule insecurity by usual working pattern, income insecurity (deprivation pathway) by net monthly income, income insecurity (stress pathway) by income satisfaction, status by National Statistics Socioeconomic Classification (NSSEC), and job insecurity by likelihood of losing job in next 12 months. These proxy variables are by no means perfect, but the hope is they will give an indication of whether they are mechanisms of poor health in zero-hours workers, rather than a precise estimate of their effect.

Two measures of income are used in the model: net monthly income and income satisfaction. It is thought that they will capture different pathways of income as suggested in the theory (material deprivation and stress). Monthly income is thought to capture the deprivation pathway, and income satisfaction to capture the stress pathway. Since they represent different pathways through which the income mechanism travels, they should be able to exist in the model together.

Status, legal protection, and training are expected to be weaker mechanisms. Socioeconomic status (SES) has frequently been shown to impact health (Meyer, Castro-Schilo, and Aguilar-Gaxiola, 2014), and zero-hours workers are generally concentrated in lower-status jobs. However, there are endogeneity issues within the SES-health relationship, questioning if status does truly impact health (Alder and Ostrove, 1999). Regarding protection, a weak proxy (union membership) is used in this analysis, which will likely underestimate impacts. Training is thought to be weaker because it could be more of a company-specific issue, rather than a ZHC-specific issue. Training seems more relevant to, perhaps, contract work: it seems unlikely that firms would explicitly exclude zero-hours workers from training. Meanwhile, contract workers

sometimes have different benefits which would exclude them from training exercises. It is also questioned whether lack of training would cause detriment to health. Table 1 presents summary statistics of all the variables used in the analysis.

Table 1: Summary Statistics

<b>Demographic Variables:</b>	<b>non-ZHC (n = 12,636)</b>		<b>ZHC (n = 250)</b>	
	Mean	S.D.	Mean	S.D.
Female	0.56	0.50	0.70	0.46
Age:	43.67	12.99	37.88	17.70
10-19	0.03	0.17	0.21	0.41
20-29	0.15	0.35	0.22	0.42
30-39	0.20	0.40	0.11	0.32
40-49	0.26	0.44	0.13	0.34
50-59	0.27	0.44	0.16	0.37
60-69	0.10	0.29	0.14	0.35
70+	0.01	0.10	0.02	0.13
Region:				
Rest of England	0.68	0.47	0.71	0.45
London	0.11	0.31	0.09	0.28
Wales	0.07	0.25	0.06	0.25
Northern Ireland	0.06	0.24	0.04	0.19
Scotland	0.09	0.28	0.10	0.30
Marital Status:				
Single	0.31	0.46	0.52	0.50
Married	0.56	0.50	0.36	0.48
Civil partner	0.01	0.09	0.01	0.09
Divorced/Separated	0.11	0.31	0.10	0.30
Other	0.02	0.12	0.01	0.11
Highest Qualification:				
Degree	0.38	0.49	0.26	0.44
Higher Degree	0.14	0.35	0.11	0.32
A level	0.22	0.42	0.38	0.49
GCSE	0.18	0.39	0.19	0.39
Other	0.05	0.22	0.04	0.21
None	0.02	0.15	0.01	0.11
Race:				
White	0.86	0.35	0.84	0.36
Mixed	0.02	0.13	0.03	0.17
Asian	0.08	0.28	0.06	0.23
Black	0.04	0.19	0.07	0.26
Other	0.01	0.07	0.00	0.00
<b>Employment Variables:</b>				
Full time student	0.02	0.15	0.21	0.41
Private sector	0.63	0.48	0.74	0.44
Permanent job	0.06	0.24	0.46	0.50
Job hours	32.80	10.82	21.54	12.76

Part time	0.27	0.45	0.53	0.50
ZHC	0.00	0.00	1.00	0.00
<b>ZHC Mechanisms:</b>				
Scheduling – Works no usual pattern	0.04	0.19	0.18	0.39
Net monthly income (deprivation path)	1737.57	1021.86	895.01	779.14
Income satisfaction (stress path):				
Completely dissatisfied	0.03	0.16	0.08	0.28
Mostly dissatisfied	0.06	0.24	0.07	0.25
Somewhat dissatisfied	0.14	0.35	0.14	0.35
Neither satisfied nor dissatisfied	0.12	0.32	0.10	0.30
Somewhat satisfied	0.23	0.42	0.22	0.41
Mostly satisfied	0.34	0.47	0.27	0.45
Completely satisfied	0.08	0.27	0.12	0.33
Job satisfaction:				
Completely dissatisfied	0.01	0.11	0.02	0.14
Mostly dissatisfied	0.03	0.17	0.02	0.15
Somewhat dissatisfied	0.08	0.27	0.10	0.30
Neither satisfied nor dissatisfied	0.09	0.28	0.08	0.28
Somewhat satisfied	0.23	0.42	0.21	0.41
Mostly satisfied	0.42	0.49	0.40	0.49
Completely satisfied	0.16	0.36	0.17	0.38
Job security – Likelihood of losing job in next 12 months:				
Very likely	0.02	0.15	0.02	0.13
Likely	0.04	0.20	0.07	0.26
Unlikely	0.42	0.49	0.40	0.49
Very unlikely	0.52	0.50	0.51	0.50
Legal protection – Union member	0.28	0.45	0.10	0.30
Training – Expect work related training	0.37	0.48	0.33	0.47
Job control – Duties:				
Manager	0.25	0.43	0.04	0.19
Supervisor	0.14	0.34	0.09	0.29
Not manager or supervisor	0.62	0.49	0.87	0.34
Status – NSSEC:				
Management	0.49	0.50	0.22	0.42
Intermediate	0.16	0.37	0.13	0.34
Small employer	0.00	0.00	0.00	0.00
Lower supervisory	0.07	0.26	0.05	0.21
Semi routine and routine	0.27	0.44	0.60	0.49
<b>Outcome Variable:</b>				
GHQ-12	11.16	5.20	12.58	6.10

*Notes: total sample size is 12,886, representing the UK working population. 12,636 are not on ZHCs and 250 are on ZHCs. The sample is split up into ZHCs/non-ZHCs to help identify any differences between the two groups.*

*Control variables are grouped into demographic and employment subcategories, and ZHC mechanism variables are expanded upon within their own subcategory. The outcome variable, GHQ-12, is measured on a scale of 0 to 36, where 0 represents the least distressed and 36 the most distressed.*

The summary statistics show that, on average, ZHC workers are younger, more-female, work fewer hours (more concentrated in part-time work) in lower-status jobs, are more private-sector focused, and have lower educational achievement. This corroborates much of the literature. They also have worse wellbeing scores – as expected. Importantly, 21% of the zero-hours sample are full-time students, whereas students make up 2% of the non-ZHC sample.

Just 4% of zero-hours workers have managerial duties, compared to 25% of non-ZHCs. This suggests that zero-hours jobs are in fact associated with lower job control. Interestingly, 22% of ZHC workers have managerial status (NSSEC), while 49% of non-ZHCs do. This highlights the varying levels of job control within ZHC and non-ZHC work: even though one-fifth of the zero-hours sample are classed as a manager, only 4% feel they have the duties of one.

Zero-hours workers are only slightly more insecure about their job than those not on ZHCs (9% vs. 6%). This is somewhat expected. It is thought that ZHC workers are more likely to be exposed to schedule/income insecurity than job insecurity. While job insecurity might be marginally more prevalent within ZHCs, it is certainly not to the extent where job insecurity necessarily appears to be a ZHC-specific risk factor.

There is little difference in job (dis)satisfaction between ZHC and non-ZHC workers. This is surprising because those in zero-hours contracts arguably experience more work-related problems (eg insecurity, lack of career progression), which would be expected to manifest themselves in lower job satisfaction. This indicates that low job satisfaction is not more prevalent in zero-hours contracts, and so is potentially not a mechanism.

The expectation that zero-hours workers experience greater scheduling and income insecurity is indicated in the table: 18% of ZHC workers do not have a usual work pattern, whereas only 4% of non-ZHC workers do. 15% of ZHC workers are dissatisfied with their income compared

to 9% of non-ZHCs. This might be explained by the difference in net monthly income: non-ZHC workers earn, on average, almost double than that of zero-hours workers.

### **3.2 Methodology**

#### Aims

The aims of the analysis are to evaluate the impacts of zero-hours contracts on mental health and to identify mechanisms through which they impact wellbeing.

The impacts of stress are not explicitly analysed. The research interest here is the effects of ZHCs and what drives them, not how the effects are driven: it is widely accepted that stress is a driving factor of poor health in employment. What is arguably more important (from a policy/general perspective) is to look at what specific aspects of ZHCs lead to worse wellbeing, rather than reiterating how stress can lead to worse health.

#### Estimation method

To estimate a health impact of ZHCs and to identify potential mechanisms, regression analyses are run using the Ordinary Least Squares (OLS) estimator. The following model is specified:

$$GHQ = \beta_0 + \beta_1 ZHC_i + X' \gamma_i + Y' \delta_i + \varepsilon_i \quad (1)$$

Where GHQ is GHQ score (measured on a scale from 0 to 36 with a higher score indicating poorer wellbeing), ZHC is the ZHC status dummy variable,  $X'$  is a vector of control variables (presented under demographic and employment characteristics in the summary statistics),  $Y'$  is a vector of potential mechanisms (as discussed in the data section), and  $\varepsilon$  is the disturbance term.

A basic form of model (1) without the potential mechanisms is first estimated to identify the effect of ZHCs on health, shown in column two in table 2. Then the full model is run, where mechanisms are staggered into the model one by one, as shown in column three onwards. This

is to identify which individual dimensions decrease the ZHC coefficient, thus suggesting themselves as mechanisms.

Model (1) is also estimated on a restricted sample where full-time students are excluded (Table 3). This is an extension of the mechanism analysis, exploring whether there is a greater impact of the ZHC mechanisms on workers whose main labour market focus is employment (rather than education). It is expected that full-time students attach less importance to their jobs as education is their priority, which might lessen their perceived impacts of ZHCs. The mechanisms are staggered in just as before, but only the effects on ZHC status are noted in this table due to the specific focus of this analysis.

### Hypotheses

Following the literature, it is hypothesised that zero-hours contracts will have a negative impact on wellbeing. Thus, the (first) null hypothesis states that while controlling for external factors, being on a zero-hours contract has no effect on the expected value of mental health, as measured by GHQ score. The alternative hypothesis is that ZHC status has a negative impact on wellbeing.

It is additionally hypothesised that (at least some of) the mechanisms discussed drive the negative impact of zero-hours work on mental health. It is expected that when the mechanisms are added to the model, the estimate of  $\beta_{\text{ZHC}}$  will decrease in absolute value as the coefficient explains less as the mechanisms are added in. The (second) null hypothesis is that, while controlling for external factors, including the proposed mechanisms has no effect on the ZHC coefficient, thus indicating that they are not a mechanism behind the health impacts of zero-hours contracts. The alternative hypothesis is that the mechanisms will decrease the ZHC coefficient.

As discussed, it is additionally expected that the impact of the mechanisms on the ZHC estimate will be greater when full-time students are excluded from the sample.

### Estimation issues

It is possible that ZHC employment status is partially endogenous. There may be unobserved factors which impact the selection decision made by those who go into zero-hours work, or it could be that an unobserved characteristic that is correlated with a ZHC, such as health status, impacts wellbeing and not the zero-hours contract itself. If ZHC status is endogenous, the estimate of  $\beta_{\text{ZHC}}$  cannot be interpreted as a causal impact on wellbeing.

Farina, Green and McVicar (2020a) discuss how people with existing health conditions may choose zero-hours work because of the flexibility it offers to fit in with their more demanding lifestyles. This might introduce endogeneity, causing concern regarding causality.

However, their argument concerning self-selection is unconvincing. If a health condition made life more demanding, flexible work would benefit workers since it can be fit around busier lives, especially an arrangement such as working from home or part-time work. However, a key point of this paper, based on both theory and empirical evidence, is that zero-hours jobs are inherently more uncertain and inflexible for the worker, causing stress and detriment to wellbeing. It is unlikely that those of poor health would self-select into zero-hours jobs out of flexibility reasons, when the flexibility offered by ZHCs is restricted and of a specific scope: 43% of zero-hours staff say they are on a ZHC because it is their only option (TUC, 2017). Moreover, there is often not an option whether to go into a ZHC – the industry and labour market often determines it, rather than individual choice.

Also of potential concern are the status and job control variables, which are, to an extent, linked in terms of measurement (both look at aspects of job skill). There is relatively high correlation between the measures of job control and status (0.44). This causes concern regarding

multicollinearity. Vatcheva, Lee, McCormick and Rahbar (2016) discuss that a correlation of 0.5 is usually used as a multicollinearity cut-off. They also discuss typical variance inflation factor (VIF) cut-offs as  $>5$  or  $>10$ . Analysis shows that the VIF for all variables in the model is below the suggested threshold of five, indicating that multicollinearity is likely not an issue within the model (although note that VIF can be limited in its use). Most importantly, a run of the analysis without NSSEC (or without duties) shows negligible changes to estimates and significance, and does not change the interpretation of the results. Although the relatively high correlation may be alarming, it seems that the status and control variables in fact do measure different things and have no real impact on interpretation or results.

Measurement error issues (eg underestimating the number of those on ZHCs) may also bias towards finding no result, which might therefore mean a lower bound is estimated.

#### *Omitted variables*

One of the Tompa mechanisms (work environment) is omitted from the model. This is simply due to survey limitations. It is not expected to be a strong mechanism, but this means that not all dimensions are analysed. It is also not particularly conceivable that hazard exposure is a ZHC-specific characteristic, so it is excluded. It should be remembered that the proxy mechanisms used are imperfect and one-dimensional, and so will fail to capture the multi-faceted nature of proposed mechanisms, and thus their full impacts. It is therefore likely that the effects of the mechanism proxies will be underestimated.

Any additional unobserved variables may cause biased and less precise estimates. If any variables included are related to both wellbeing and zero-hours status, this would result in spurious correlation, further questioning the causality of ZHC status on health.

#### 4. Results and Analysis

A preliminary analysis (equation 1) is run, including all flexible working types in the USoc survey (eg on-call, part-time work etc). While the coefficient on ZHC represents a significant impact on health, estimates for any other form of flexible work are found to be statistically and economically insignificant. This is not particularly surprising, since these arrangements are more in favour of the employee, so it is less likely that they impact negatively on wellbeing. As they are insignificant, the other flexible working arrangements are removed from the model. This has negligible impact on estimates. When included, interpretation of  $\beta_{ZHC}$  is more complicated, representing the effect of zero-hours contracts on mental health compared to those who do not work flexibly. Without the other flexible arrangements,  $\beta_{ZHC}$  represents the effect of ZHCs on mental health compared to all other workers.

Table 2 presents the full sample regression output and mechanism analysis. Column two shows the regression output for the initial analysis of ZHC on mental health, and the output for the staggered introduction of each mechanism is shown in column three onwards. Column eight represents final output with all mechanisms added into the model, as indicated in equation (1). The second row of the table indicates which mechanism (group) is added (eg income satisfaction), while the first column shows the added mechanisms in detail (eg completely satisfied with income etc).

Note the final column “grouped”: this represents the legal protection, training opportunities, duties, and status mechanisms. Initially these were added individually, like the rest, but they all increased the ZHC coefficient by a very small amount. Therefore, they are grouped together because of their weak effects and to save space.

Table 2: Impact of zero-hours contracts on mental health

1	2	3	4	5	6	7	8
	No Mechanisms	Schedule	Income	Income satisfaction	Job satisfaction	Job insecurity	Grouped
ZHC status	1.216*** (0.341)	1.189*** (0.342)	1.130*** (0.343)	0.958*** (0.327)	0.893*** (0.309)	0.969*** (0.309)	0.995*** (0.309)
Schedule		0.233 (0.231)	0.215 (0.231)	0.081 (0.220)	0.147 (0.208)	0.172 (0.208)	0.180 (0.208)
Log(income)			-0.337*** (0.099)	0.153 (0.095)	0.117 (0.091)	0.129 (0.090)	0.013 (0.096)
Income: completely dissatisfied				3.423*** (0.288)	3.128*** (0.273)	3.122*** (0.273)	3.127*** (0.273)
Income: mostly dissatisfied				1.670*** (0.214)	1.455*** (0.203)	1.456*** (0.202)	1.452*** (0.202)
Income: somewhat dissatisfied				0.939*** (0.171)	0.740*** (0.163)	0.730*** (0.162)	0.728*** (0.162)
Income: somewhat satisfied				-1.306*** (0.156)	-1.019*** (0.148)	-1.004*** (0.148)	-1.012*** (0.148)
Income: mostly satisfied				-2.295*** (0.149)	-1.632*** (0.142)	-1.589*** (0.142)	-1.611*** (0.142)
Income: completely satisfied				-3.011*** (0.199)	-2.075*** (0.191)	-2.007*** (0.191)	-2.041*** (0.191)
Job: completely dissatisfied					4.758*** (0.383)	4.656*** (0.383)	4.624*** (0.383)
Job: mostly dissatisfied					3.384*** (0.279)	3.290*** (0.279)	3.258*** (0.279)
Job: somewhat dissatisfied					1.580*** (0.204)	1.521*** (0.204)	1.497*** (0.204)
Job: somewhat satisfied					-0.483*** (0.166)	-0.446*** (0.165)	-0.453*** (0.165)
Job: mostly satisfied					-1.978*** (0.157)	-1.882*** (0.157)	-1.882*** (0.157)
Job: completely satisfied					-3.085*** (0.178)	-2.909*** (0.179)	-2.898*** (0.179)
Job loss: very likely						0.315 (0.288)	0.306 (0.288)

Job loss: likely						0.575*** (0.211)	0.588*** (0.211)
Job loss: very unlikely						-0.632*** (0.087)	-0.640*** (0.087)
Union							0.061 (0.101)
Training							0.201** (0.089)
Duties							-0.284*** (0.106)
Status: Intermediate							-0.165 (0.133)
Status: Lower supervisory							-0.291* (0.172)
Status: Semi routine or routine							-0.234* (0.131)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R <sup>2</sup>	0.029	0.029	0.030	0.119	0.212	0.216	0.218
Mean GHQ	11.190						

Notes: total sample size is 12,886, representing the UK working population. 12,636 are not on ZHCs and 250 are on ZHCs.

Column two shows the regression output for the initial analysis of ZHC on mental health, and the outputs for the staggered introduction of each mechanism are shown in column three onwards. Column eight represents the final output with all mechanisms added into the model, as indicated in equation (1). The second row of the table indicates which mechanism (group) is added (eg income satisfaction), while the first column shows the added mechanisms in detail (eg completely satisfied with income etc).

The final column “grouped” represents the legal protection, training opportunities, duties, and status mechanisms. These were added individually, like the rest, but they all increased the ZHC coefficient by a very small amount. Therefore, they are grouped together because of their weak effects and to save space.

Full initial (non-mechanism) output found as Table A in appendix.

\*\*\* = 1% \*\* = 5% \* = 10% significance

## 4.1 Initial analysis

Column two of table two gives the initial analysis of the effect of ZHCs on health. The estimate on  $\beta_{ZHC}$  is 1.22, indicating that zero-hours employees' mental health is 12.2% worse than the average worker. It should be noted here that a higher GHQ value is indicative of worse mental health. This is a statistically significant result to the 1% level, and so the first null hypothesis is rejected at the 1% level, indicating that ZHC work does impact wellbeing.

However, the significance does not definitively mean that the effects found are causal. As discussed, the potential endogeneity issues surrounding the ZHC variable can have biasing effects and mean that the estimated effect is not causal. In similar studies, fixed effects or instrumental variable approaches are used to account for this potential endogeneity. There are very few viable instruments for zero-hours work – it needs to be something which can represent ZHC employment, but not be correlated to health in the same way in which ZHC may be.

These results are in line with the theory and previous studies: working on a zero-hours contract is associated with worse mental health.

The value of R-squared should also be noted: 0.029 (Column 2), indicating that the initial model only explains about 3% of wellbeing. However, the  $R^2$  can be low in social sciences since human behaviour is relatively irrational and unpredictable. It is also of little concern because the aim is to estimate the effect of ZHCs on health; not to construct a full and complete model of health.

### Potential mechanisms

The results of the staggered introduction of potential mechanisms are shown in column three onwards. Adding the mechanisms substantially reduce the ZHC coefficient from 1.22 to 0.99. Its significance marginally decreases, but it remains significant to the 1% level. This indicates that the some of the mechanisms added do explain some of the effects of ZHCs, but they do not completely explain them. This is expected since weak proxies are used, and not every mechanism

is included. However, the fact that an effect is found is a strong indication that these are mechanisms through which ZHCs cause detriment to health. Not only do mechanisms reduce the ZHC coefficient, but they add a lot to the explanatory power of the model as shown in the increase R-squared statistic, indicating greater validity and reliability.

The second null hypothesis is rejected as income insecurity (both deprivation and stress pathways) and job satisfaction decreased  $\beta_{ZHC}$ , thus identifying themselves as mechanisms through which zero-hours contract harm mental health. Further, the estimates of income insecurity (stress) and job satisfaction are statistically significant to the 1% level. Legal protection, training opportunities, job control, status, and job insecurity increase the ZHC coefficient, indicating that they are not mechanisms. Most of the non-mechanisms are universal across all job types and are not specific to zero-hours contracts, which might give an indication as to why they are not ZHC mechanisms. Furthermore, some (eg legal protection) may simply not affect health. These results are mostly as expected. While schedule insecurity does decrease the ZHC coefficient, it is not statistically significant. Therefore, it is undetermined whether it is a ZHC mechanism. It is expected to be a mechanism: it is much more prevalent within zero-hours jobs, and it has been shown to be detrimental to wellbeing. However, the empirical results are inconclusive; further research is needed.

Job insecurity is not identified as a ZHC-specific mechanism. Both theory and literature suggest that job insecurity is prevalent in zero-hours work and that it is a threat to wellbeing. However, as discussed throughout this paper, zero-hours contracts are associated with schedule/income insecurity, but not necessarily job insecurity: the heterogeneity in use of the term job insecurity causes confusion. It appears that job insecurity is not as widely experienced in (or specific to) zero-hours employment as may be thought, and that it might be more likely a “general employment” mechanism, rather than ZHC-specific. Even though job insecurity increases the ZHC coefficient, two job insecurity variables are statistically significant. This supports the

argument that job insecurity does impact mental health, but as a general employment mechanism rather than a zero-hours specific one.

Somewhat surprising is that schedule insecurity is not confirmed as a ZHC mechanism: while it decreases the ZHC coefficient, it is statistically insignificant. This is most likely due to a weak proxy being used, which measures if the worker has a usual working pattern. It does not consider more serious factors associated with scheduling insecurity, such as unexpected shift changes, shift cancellations, or zeroing down (arguably one of the greatest sources of stress within ZHCs). Working pattern therefore likely captures a less-meaningful aspect of schedule insecurity: something that is maybe more of a general inconvenience, rather than a potential harm to wellbeing.

It has been shown above that schedule insecurity is a problem particularly specific to zero-hours work and that it can be harmful to mental health. It is therefore conceivable that it is a ZHC mechanism. However, the insignificance, perhaps a result of variable limitations, does not allow confirmation of this. As mentioned above, further (more specific) analysis is needed.

The theory and literature suggest that job control is a mechanism, and summary statistics indicate a much lower level of control in zero-hours jobs. That it is not a mechanism is therefore unexpected, but again perhaps because of a poor proxy. Duties should, in theory, represent different levels of control. However, managerial/supervisory levels of control vary significantly across jobs, companies, and industries. Not only that, but the base level of control in non-managerial/non-supervisory roles is much greater in non-ZHC jobs than ZHCs – as highlighted in the summary statistics. Considering the inconsistency of job control and roles between ZHCs and non-ZHCs, duties might not necessarily be a valid comparator and thus proxy. Low job control might still be a ZHC mechanism, but the wrong proxy might have been used. Perhaps a measure such as level of job responsibility would show a different result.

The result of job (dis)satisfaction is relatively surprising after reviewing the summary statistics, since there is little difference in satisfaction between ZHC and non-ZHC workers. However, this might be due to other uncontrolled confounding factors in the summary statistics. Further, it is not unexpected that low job satisfaction is a ZHC mechanism. There are many potential sources of job dissatisfaction in zero-hours contracts, both controlled for in this model (eg insecurity) but also uncontrolled for (eg lack of career progression or work environment). Job dissatisfaction has been shown to be detrimental to health, so it makes sense that it is a mechanism. One weakness of this variable is its ambiguity as a concept, which proves unhelpful for future policy recommendations.

When first added, net monthly income is significant to the 1% level, however it becomes statistically and economically insignificant when income satisfaction is included. Originally, it was thought this was due to correlational issues: if monthly income and income satisfaction are reasonably connected (as might be assumed), this could introduce issues of multi/perfect collinearity. However, further analysis finds correlation between the two variables of 0.17, indicating that in fact they do measure two different things (possibly stress and deprivation). What this instead might suggest is that stress might be a more common/stronger pathway than deprivation, as suggested in the Tompa framework.

#### **4.2 Analysis without full-time students**

The model is rerun after excluding full-time students from the sample. As discussed, this is because students might attach less importance to their job, and so the mechanisms will likely have a stronger impact on the ZHC coefficient without them. As before, each column represents the addition of a new mechanism (group) into the analysis. Note here that only the effect on ZHC coefficient is of interest, as this analysis is to identify whether there are stronger mechanism

effects without full-time students. The sample size falls from 12,886 to 12,534 when full-time students are excluded.

Table 3: Impact of zero-hours contracts on mental health on full-time workers  
(no full-time students)

1	2	3	4	5	6	7	8
	No Mechanisms	Schedule	Income	Income satisfaction	Job satisfaction	Job insecurity	Grouped
ZHC	1.211*** (0.379)	1.179*** (0.380)	1.124*** (0.380)	0.837** (0.362)	0.703** (0.342)	0.799** (0.341)	0.829** (0.341)
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R <sup>2</sup>	0.028	0.028	0.029	0.120	0.215	0.220	0.222

*Notes: sample size is 12,534, representing the UK working population who are not full-time students.*

*Full-time students are removed from this sample, and the same analysis as above is run again. Column two shows the regression output for the initial analysis of ZHC on mental health, and the outputs for the staggered introduction of each mechanism are shown in column three onwards. Column eight represents final output with all mechanisms added into the model, as indicated in equation (1).*

*The final column “grouped” represents the legal protection, training opportunities, duties, and status mechanisms. These were added individually, like the rest, but they all increased the ZHC coefficient by a very small amount. Therefore, they are grouped together because of their weak effects and to save space.*

*Full initial (non-mechanism) output found as Table B in appendix.*

*\*\*\* = 1% \*\* = 5% \* = 10% significance*

Without full-time students, there is minimal change to the initial (no mechanism) estimate of the effect of ZHCs on mental health, as shown in column two. As expected, however, the mechanisms have a greater impact on  $\beta_{ZHC}$ , reducing the final estimate to 0.829 in column eight. Of importance is the statistical significance: ZHC status is no longer significant to the 1% level after adding the mechanisms. This indicates a much stronger argument for the presence and function of these mechanisms in the poor health of zero-hours workers.

The direction of the effects/mechanisms is the same as in table 2. This is unsurprising for some, but surprising for others, such as training opportunities (which, again, slightly increases the

coefficient). Following the idea that students attach less importance to/reliance on their jobs, it is expected that of lack of training opportunities is more impactful when students are excluded. However, this result indicates that it might simply be that training opportunities (or lack thereof) do not impact on mental health. It might perhaps frustrate workers, but not to the extent where it harms health.

The two analyses have shown that there is a highly statistically significant association between zero-hours contracts and mental health. Although significant, it cannot be deemed a causal impact due to potential endogeneity issues. However, the analysis has allowed identification of key mechanisms through which ZHCs lead to poor mental health: income insecurity and job dissatisfaction. It has also identified employment-related factors which are not ZHC mechanisms, but perhaps general employment mechanisms. Additionally, it has raised the issue of scheduling insecurity and the need for more research into it.

## **5. Conclusion**

A highly significant association is found between zero-hours contracts and poor mental health, where the mental health of those on ZHCs is 12.2% worse than other workers. Income insecurity and low job satisfaction are identified as mechanisms through which ZHCs harm mental health, and various other factors are identified as non-specific mechanisms. The findings regarding schedule insecurity are inconclusive, yet given the discussion above, it is plausible that it is a ZHC-specific mechanism. Further research is needed to confirm this.

There are three main limitations of this paper: the underestimation of ZHC workers in the sample, the weak proxies used, and potential endogeneity issues. The small proportion of ZHC workers in the sample and the weak proxies used have the same general effect: they indicate direction, but perhaps limit the precision of the estimates of the magnitude of effect. Additionally, the

proxies do not cover all aspects of the dimensions, for example zeroing down is not included and thus the results might underestimate the true impact of the mechanisms. The use of time series data could have been introduced to help mitigate the effects of endogeneity, or if there had been a valid IV estimator. The potential endogeneity issues do not allow for a causal impact to be confidently claimed. Furthermore, due to the ambiguity surrounding the definition of ZHCs, the true sample size of zero-hours workers may be underestimated, again introducing measurement error.

These findings have significant implications for future policy. Banning ZHCs, as previously proposed by the Labour Party (MacAskill and Helm, 2017), would be counterproductive. Zero-hours contracts have potential to be a valuable tool used which can benefit both firms and employees. Indeed, there are some groups of people who would prefer to be on this contract type, for example, students or semi-retirees. However, there needs to be greater care and balance taken when using them, as they can cause significant detriment to wellbeing.

One potential policy resolution is to continue allowing ZHCs but offer more secure contracts to workers who work regular hours, or simply who would rather not be on a ZHC. This would shift the dynamic, putting more control in employees' hands and allowing greater flexibility to those who need it and greater security to others. One would argue that this should not be a trade-off, and rightly so. In some instances where ZHCs are managed well, there is no trade-off. Workers feel secure in their jobs but also experience the benefits of increased flexibility. This cannot be achieved through policy: firms need to work with their staff better.

Although statistically insignificant in the analysis, the biggest area of concern within ZHCs is arguably schedule insecurity. There are two main points of concern: shift uncertainty and zeroing down. Shifting the imbalance from manager-focused flexibility to employee-focused flexibility is a reasonable first step. The effects of schedule insecurity on wellbeing can be mitigated if

employers give more schedule control to employees (Felstead et al., 2020). For zero-hours contracts to work effectively, there needs to be a shift from one-sided flexibility, and a greater focus on employee care.

More importantly, intervention is needed to prevent future zeroing down. It is both unethical and harmful to put all the pressure of flexibility onto staff, punishing them when their schedules do not align with that of the company. It is potentially the most significant harm of zero-hours contracts, contributing significantly to insecurity and poor mental health.

Considering the harmful effects these contracts can have, more specific research needs to be undertaken into both the effects of them and mechanisms behind them. If specific factors can be identified, productive action can be taken to mitigate the harmful impacts of zero-hours contracts.

## Bibliography

Adams, A. and Prassl, J. (2018) *Zero-hours work in the United Kingdom*. International Labour Organisation. Conditions of work and employment series, no. 101 [Online] Available at:

[www.ilo.org/wcmsp5/groups/public/---ed\\_protect/---protrav/---travail/documents/publication/wcms\\_624965.pdf](http://www.ilo.org/wcmsp5/groups/public/---ed_protect/---protrav/---travail/documents/publication/wcms_624965.pdf) (Accessed 18 April 2021)

Adler, N.E. and Ostrove, J.M. (1999) Socioeconomic status and health: what we know and what we don't. *Annals of the New York academy of Sciences*, vol. 896, no. 1, pp.3-15.

Avram, S. (2020) *Zero-hours contracts: Flexibility or insecurity? Experimental evidence from a low income population*. ISER Working Paper Series [Online]. Available at:

[www.iser.essex.ac.uk/research/publications/working-papers/iser/2020-10](http://www.iser.essex.ac.uk/research/publications/working-papers/iser/2020-10) (Accessed 25 April 2021)

Benach, J., Vives, A., Amable, M., Vanroelen, C., Tarafa, G. and Muntaner, C. (2014) Precarious employment: understanding an emerging social determinant of health. *Annual review of public health*, vol. 35, pp.229-253.

Bosma, H., Marmot, M.G., Hemingway, H., Nicholson, A.C., Brunner, E. and Stansfeld, S.A. (1997) Low job control and risk of coronary heart disease in Whitehall II (prospective cohort) study. *Bmj*, vol. 314, no. 7080, pp.541-569.

Bridges, S. and Disney, R. (2010) Debt and depression. *Journal of health economics*, vol. 29, no. 3, pp.388-403.

Burchell, B. (2011) A temporal comparison of the effects of unemployment and job insecurity on wellbeing. *Sociological Research Online*, vol. 16, no. 1, pp.66-78.

Campbell, I. (2019) Zero hours work arrangements in New Zealand: Union action, public controversy and two regulatory initiatives. In: O'Sullivan M. et al. (eds) *Zero Hours and On-call Work in Anglo-Saxon Countries*. Springer [Online] (Accessed: 18 April 2021)

Chandola, T., Brunner, E. and Marmot, M. (2006) Chronic stress at work and the metabolic syndrome: prospective study. *Bmj*, vol. 332, no. 7540, pp.521-525.

CIPD (2013) *Zero-hours Contracts: Myth and Reality* [Online]. Available at: [www.cipd.co.uk/Images/zero-hours-contracts\\_2013-myth-reality\\_tcm18-10710.pdf](http://www.cipd.co.uk/Images/zero-hours-contracts_2013-myth-reality_tcm18-10710.pdf) (Accessed 25 April 2021)

CIPD (2015) *Zero-hours and Short-hours Contracts in the UK: Employer and Employee perspectives* [Online] Available at: [www.cipd.co.uk/Images/zero-hours-and-short-hours-contracts-in-the-uk\\_2015-employer-employee-perspectives\\_tcm18-10713.pdf](http://www.cipd.co.uk/Images/zero-hours-and-short-hours-contracts-in-the-uk_2015-employer-employee-perspectives_tcm18-10713.pdf) (Accessed 20 April 2021)

Dalgard, O.S., Sorensen, T., Sandanger, I., Nygård, J.F., Svensson, E. and Reas, D.L. (2009) Job demands, job control, and mental health in an 11-year follow-up study: Normal and reversed relationships. *Work & stress*, vol. 23, no. 3, pp.284-296.

Datta, N., Giupponi, G. and Machin, S. (2019) Zero-hours contracts and labour market policy. *Economic Policy*, vol. 34, no. 99, pp.369-427.

De Witte, H., Vander Elst, T. and De Cuyper, N. (2015) Job insecurity, health and well-being. In: Vuori, J., Blonk, R. and Price, R. H. (eds.) *Sustainable Working Lives*. Springer [Online] (Accessed: 26 April 2021)

Department for Business Innovation and Skills (2013) *Consultation: Zero hours employment contracts* [Online]. Available at:

[assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/267634/bis-13-1275-zero-hours-employment-contracts-FINAL.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/267634/bis-13-1275-zero-hours-employment-contracts-FINAL.pdf) (Accessed 25 April 2021)

Department for Business, Energy & Industrial Strategy (2015) *Zero hours contracts: guidance for employers* [Online]. Available at: [www.gov.uk/government/publications/zero-hours-contracts-guidance-for-employers/zero-hours-contracts-guidance-for-employers](https://www.gov.uk/government/publications/zero-hours-contracts-guidance-for-employers/zero-hours-contracts-guidance-for-employers) (Accessed 25 April 2021)

Elst, T.V., De Cuyper, N. and De Witte, H. (2011) The role of perceived control in the relationship between job insecurity and psychosocial outcomes: moderator or mediator?. *Stress and Health*, vol. 27, no. 3, pp.215-227.

Farina, E., Green, C. and McVicar, D. (2020)b Zero hours contracts and their growth. *British Journal of Industrial Relations*, vol. 58, no. 3, pp.507-531.

Farina, E., Green, C.P. and McVicar, D. (2020)a *Is Precarious Employment Bad for Worker Health? The Case of Zero Hours Contracts in the UK*. IZA Discussion Paper Series, No. 13116

Felstead, A., Gallie, D., Green, F. and Henseke, G. (2020) Unpredictable times: the extent, characteristics and correlates of insecure hours of work in Britain. *Industrial Relations Journal*, vol. 51, no.1-2, pp.34-57.

Goldberg, D.P., Gater, R., Sartorius, N., Ustun, T.B., Piccinelli, M., Gureje, O. and Rutter, C. (1997) The validity of two versions of the GHQ in the WHO study of mental illness in general health care. *Psychological medicine*, vol. 27, no. 1, pp.191-197.

Green, C.P. and Leeves, G.D. (2013) Job security, financial security and worker well-being: New evidence on the effects of flexible employment. *Scottish Journal of Political Economy*, vol. 60, no. 2, pp.121-138.

Greenhalgh, L. and Rosenblatt, Z. (1984) Job insecurity: Toward conceptual clarity. *Academy of Management review*, vol. 9, no. 3, pp.438-448

Henderson, M. (2019) The quarter-life crisis? precarious labour market status and mental health among 25-year-olds in England. *Longitudinal and Life Course Studies*, vol. 10, no. 2, pp.259-276.

Henly, J.R. and Lambert, S.J. (2014) Unpredictable work timing in retail jobs: Implications for employee work–life conflict. *Ilr Review*, vol. 67, no. 3, pp.986-1016.

Johnson, J.V. and Hall, E.M. (1988) Job strain, work place social support, and cardiovascular disease: a cross-sectional study of a random sample of the Swedish working population. *American journal of public health*, vol. 78, no. 10, pp.1336-1342.

Johnson, Jeffrey V., Ellen M. Hall, and Töres Theorell. (1989) Combined effects of job strain and social isolation on cardiovascular disease morbidity and mortality in a random sample of the Swedish male working population. *Scandinavian journal of work, environment & health*, vol. 15, no. 4, pp271-279.

Kachi, Y., Otsuka, T. and Kawada, T. (2014) Precarious employment and the risk of serious psychological distress: a population-based cohort study in Japan. *Scandinavian journal of work, environment & health*, vol. 40, no. 5, pp.465-472.

Karasek Jr, R.A. (1979) Job demands, job decision latitude, and mental strain: Implications for job redesign. *Administrative science quarterly*, vol. 24, no. 2, pp.285-308.

Koumenta, M. and Williams, M. (2019) An anatomy of zero-hour contracts in the UK. *Industrial Relations Journal*, vol. 50, no. 1, pp.20-40.

Lavery, S. (2014) *The Politics of Precarious Employment in Europe: Zero Hour Contracts and The Commodification of Work: Precarious Employment in Europe*, FEPS Young Economics

Network Working Paper [Online] Available at: [www.renner-institut.at/fileadmin/user\\_upload/Themen/Europa/wg\\_precarious\\_employment\\_in\\_europe.pdf](http://www.renner-institut.at/fileadmin/user_upload/Themen/Europa/wg_precarious_employment_in_europe.pdf)

(Accessed 19 April 2021)

Lewchuk, W., Clarke, M. and De Wolff, A. (2008) Working without commitments: precarious employment and health. *Work, employment and society*, vol. 22, no. 3, pp.387-406.

Lewchuk, W., De Wolff, A., King, A. and Polanyi, M. (2003) From job strain to employment strain: Health effects of precarious employment. *Just Labour*, vol. 3, pp.23-35

MacAskill and Helm (2017), 'Labour party pledges to outlaw all zero-hours contracts', *The Guardian*, Available at: [www.theguardian.com/politics/2017/apr/29/election-labour-mcdonnell-corbyn-zero-hours-economy](http://www.theguardian.com/politics/2017/apr/29/election-labour-mcdonnell-corbyn-zero-hours-economy) (Accessed 20 April 2021)

Marmot, M. and Theorell, T. (1988) Social class and cardiovascular disease: the contribution of work. *International Journal of Health Services*, vol. 18. no. 4, pp.659-674.

Melchior, M., Caspi, A., Milne, B.J., Danese, A., Poulton, R. and Moffitt, T.E. (2007) Work stress precipitates depression and anxiety in young, working women and men. *Psychological medicine*, vol. 37, no. 8, pp.1119-1129

Meyer, O.L., Castro-Schilo, L. and Aguilar-Gaxiola, S. (2014) Determinants of mental health and self-rated health: a model of socioeconomic status, neighborhood safety, and physical activity. *American journal of public health*, vol. 104, no. 9, pp.1734-1741.

Nadinloyi, K.B., Sadeghi, H. and Hajloo, N. (2013) Relationship between job satisfaction and employees mental health. *Procedia-Social and Behavioral Sciences*, vol. 84, pp.293-297.

Office for National Statistics (2021) *EMP17: People in employment on zero-hours contracts*. Available at:

[www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/datasets/empl7peopleinemploymentonzerohourscontracts](http://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/datasets/empl7peopleinemploymentonzerohourscontracts) (Accessed 27 April 2021)

Ravalier, J., Morton, R., Russell, L. and Rei Fidalgo, A. (2019) Zero-hour contracts and stress in UK domiciliary care workers. *Health & social care in the community*, vol. 27, no. 2, pp.348-355.

Ravalier, J.M., Fidalgo, A.R., Morton, R. and Russell, L. (2017) The influence of zero-hours contracts on care worker well-being. *Occupational Medicine*, vol. 67, no. 5, pp.344-349.

Rohde, N., Tang, K.K., Osberg, L. and Rao, P. (2016) The effect of economic insecurity on mental health: Recent evidence from Australian panel data. *Social Science & Medicine*, vol. 151, pp.250-258.

Romppel, M., Elmar B., Marcus R., and Heide G.. (2013) What is the General Health Questionnaire-12 assessing?: Dimensionality and psychometric properties of the General Health Questionnaire-12 in a large scale German population sample. *Comprehensive psychiatry* vo., 54, no. 4, pp.406-413.

Scott-Marshall, H. and Tompa, E. (2011) The health consequences of precarious employment experiences. *Work*, vol. 38, no. 4, pp.369-382.

Thorley, C. and Cook, W. (2017) *Flexibility for who? Millennials and mental health in the modern labour market*, Institute for Public Policy research [Online]. Available at: [www.ippr.org/files/2017-07/flexibility-for-who-report-july-2017.pdf](http://www.ippr.org/files/2017-07/flexibility-for-who-report-july-2017.pdf) (Accessed 25 April 2021)

Tompa, E., Scott-Marshall, H., Dolinschi, R., Trevithick, S. and Bhattacharyya, S. (2007) Precarious employment experiences and their health consequences: towards a theoretical framework. *Work*, vol. 28, no. 3, pp.209-224.

TUC (2017) *Great Jobs with Guaranteed Hours: What do workers really think about 'flexible' zero-hours contracts?* [Online]. Available at: [www.tuc.org.uk/sites/default/files/great-jobs-with-guaranteed-hours\\_0.pdf](http://www.tuc.org.uk/sites/default/files/great-jobs-with-guaranteed-hours_0.pdf) (Accessed 20 April 2021)

UKCES (2014) *Flexible Contracts: Behind the Headlines* [Online]. Available at: [assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/302989/flexible-contracts-final.pdf](http://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/302989/flexible-contracts-final.pdf) (Accessed 20 April 2021)

University of Essex, Institute for Social and Economic Research. (2020). *Understanding Society: Wave 10, 2018-2019. 13th Edition*. UK Data Service.

Vatcheva, K.P., Lee, M., McCormick, J.B. and Rahbar, M.H. (2016) Multicollinearity in regression analyses conducted in epidemiologic studies. *Epidemiology (Sunnyvale, Calif.)*, vol. 6, no. 2., pp.227

Witte, H.D. (1999) Job insecurity and psychological well-being: Review of the literature and exploration of some unresolved issues. *European Journal of work and Organizational psychology*, vol. 8, no. 2, pp.155-177.

Wood, A., Burchell, B.J. and Coutts, A. (2016) *From zero joy to zero stress: making flexible scheduling work-the university of Cambridge Zero2Zero workshops*. Cambridge University Zero2Zero Workshops [Online]. Available at: [www.zero.sociology.cam.ac.uk/Documents/finalreport](http://www.zero.sociology.cam.ac.uk/Documents/finalreport) (Accessed 25 April 2021)

Wood, A. J., Burchell, B. J. (2014). *Zero hour contracts as a source of job insecurity amongst low paid hourly workers*, University of Cambridge, Individual in the Labour Market Research Group [Online]. Available at: [ora.ox.ac.uk/objects/uuid:f115e386-543b-4608-b818-0f3c1dcd4dc4](http://ora.ox.ac.uk/objects/uuid:f115e386-543b-4608-b818-0f3c1dcd4dc4) (Accessed 21 April 2021)

## Appendix

Table A: Full sample regression output. No mechanisms

Variable:	Coefficient (standard error)
10-19	2.078*** (0.527)
20-29	2.036*** (0.479)
30-39	2.460*** (0.467)
40-49	2.164*** (0.462)
50-59	1.966*** (0.459)
60-69	1.276*** (0.468)
Female	1.026*** (0.100)
Asian	0.029 (0.175)
Black	-0.800*** (0.255)
Mixed	0.813** (0.342)
Other race	0.542 (0.659)
Civil partner	-0.022 (0.537)
Divorced/Separated	-0.230 (0.181)
Married	-0.739*** (0.124)
Other marital status	-0.222 (0.397)
Degree	0.429 (0.329)
Other higher degree	0.534 (0.340)
A level	0.450 (0.331)
GCSE	0.472 (0.333)
Other qualification	0.160 (0.372)
Scotland	-0.073 (0.164)
Northern Ireland	-0.758*** (0.197)
Wales	0.400** (0.188)
London	-0.236 (0.161)
Private sector	-0.414*** (0.100)
Non-permanent job	0.061 (0.191)
Job hours	-0.001 (0.005)
ZHC	1.216*** (0.341)
R <sup>2</sup>	0.029
Mean GHQ	11.191

\*\*\* = 1% \*\* = 5% \* = 10% significance

Table B: Restricted sample – without full-time students regression output. No mechanisms

Variable:	Coefficient (standard error)
10-19	1.785*** (0.571)
20-29	2.026*** (0.480)
30-39	2.472*** (0.466)
40-49	2.170*** (0.461)
50-59	1.976*** (0.458)
60-69	1.283*** (0.467)
Female	0.975*** (0.102)
Asian	0.113 (0.179)
Black	-0.838*** (0.259)
Mixed	0.599* (0.350)
Other race	0.544 (0.657)
Civil partner	-0.030 (0.536)
Divorced/Separated	-0.228 (0.181)
Married	-0.75*** (0.124)
Other marital status	-0.219 (0.396)
Degree	0.445 (0.333)
Other higher degree	0.544 (0.344)
A level	0.466 (0.336)
GCSE	0.497 (0.337)
Other qualification	0.179 (0.375)
Scotland	-0.173 (0.167)
Northern Ireland	-0.732*** (0.200)
Wales	0.415** (0.189)
London	-0.265 (0.162)
Private sector	-0.435*** (0.101)
Non-permanent job	0.205 (0.204)
Job hours	0.0002 (0.005)
ZHC	1.211*** (0.379)
R <sup>2</sup>	0.028
Mean GHQ	11.168

\*\*\* = 1% \*\* = 5% \* = 10% significance