The negative effects of workplace stress are considered one of the biggest current threats to business, and organisational change is increasingly recognised as a major source of this stress. This work investigates the role of age in organisational change-related stress. Employee stress levels and perceived stressors before and after a major IT deployment were measured, to determine whether older workers experience greater stress than their younger colleagues across periods of organisational change, whether learning pressure during change causes more stress for the older group, and any role stereotyping may play. Results suggest that older people report a higher incidence of typical stress-related psychosomatic symptoms during change than their younger colleagues, although self-perceptions of stress were static. They more readily identify increased learning demand as stressful. Some stereotypical views about age and efficacy of learning are discovered, and their impact explored. The implications for organisations and possible areas for further research are discussed.
The Relationship between Age, Stress and Learning during Organisational Change

1. Introduction

The population is aging; the Office of National Statistics (2010a) estimates the proportion of the UK population aged 65 or over will rise from its 2008 level of around 16% to 23% by 2033. Research (ONS, 2010) shows that people are living longer which, combined with a falling birthrate, means the average age is increasing. This and the tendency to delay retirement is consequentially raising the average age of the working population.

The Equality Act 2010 and the Health and Safety at Work Act, 1974 both have implications for employers and HRM when managing change within organisations; any ‘provision, criterion or practice’ that disadvantages or causes a detriment to workers of a particular age group could be indirectly discriminative when applied uniformly across the entire workforce (Equality Act, 2010, Part 2, Chapter 2, Subsection 19, 2 (b)) unless this can be shown to be a proportionate means of achieving a legitimate aim. Furthermore, an employer has a duty of care to provide a safe working environment and system of work for employees (HASAWA, 1974, Part 1, Section 2, Subsection 2(e)).

Workplace stress is widely recognised as potentially harmful and included in HASAWA (1974). Organisational change is recognised as one of the most potentially stressful situations (eg, Hellriegel et al, 2001; Schweiger and DeNisi, 1991).

In this study, the relationship between age and stress during periods of organisational change is explored with a focus on the role that learning plays in the relationship between employee age and stress. Specifically, the research questions are as follows:

- Are employees differentially affected by change-related stress according to their age?
- To what extent do subjects identify the pressures of learning or uncertainty about how to carry out their changed job as stressors? Is this age-related?
- What effect does stereotyping have in this context?
- What, if any, are the implications for HR and L&D Policy and Practice?

2. Stress in the Workplace

An organisation’s need to adapt to environmental changes may be critical to their ability to compete (eg, Yu, 2009), but rather than being welcomed as providing an environment in which people can become enriched and fulfilled, organisational change may be the greatest source of stress in a person’s career, and possibly their entire life (eg, Hellriegel et al, 2001; Schweiger and DeNisi, 1991).

Stress is a condition which leads to all manner of physical and mental reactions. Its negative effects are considered by many to be one of, if not the biggest threat to business in the early part of this century (HSE, in CIPD, 2008). However,
people are dissimilarly affected by change and stressors, and many factors have been empirically demonstrated to affect the level of stress experienced by employees during organisational change, either positively or negatively. These include gender (Hendrix et al, 1994; Zappert and Weinstein, 1985), perceptions of change as either a threat or a challenge (Lazarus and Folkman, 1984), preferred coping strategies (Billings and Moos, 1981; Latack, 1986; Terry and Callan, 1997), degree of job control (Spector, 2002), availability of personal or social support resources (Callan, 1993; Gerpott, 1990), job grade (Ferguson and Cheyne, 1995), personality and psychological stability (West et al, 1987) and levels of organisational commitment (Begley and Czajka, 1993).

The individual nature of stress is an important consideration in any study using self-report measures; Cohen et al (1983: 386) commented that a situation is only perceived as stressful when, firstly, it is considered by an individual as threatening or otherwise demanding, and secondly that they have insufficient resources to cope with it. Therefore, responses to questionnaire items about feelings of stress are based not on the objectively measured intensity of the event, but involve subjective personal and contextual elements, leading to variable coping strategies.

The role of stress in work performance has been studied for almost 100 years, with varying opinions emerging (Edwards et al, 2007). Van Dyne et al (2002) and Friend (1982) both found that work-related stress led to higher work performance, while significant individual, home-related stress levels resulted in lower work performance. However, causality is unclear; does stress result from self-perceived poor performance, forming a vicious circle of stress and dysfunctional performance? Alternatively, does a virtuous circle of good performance and increased self-confidence develop, so stressors are therefore perceived as less threatening? Whilst there remain unanswered questions about the nature, cause and effects of stress, it is generally accepted that sustained workplace stress is more likely to do harm than good. Similarly, from an organisational perspective, higher workplace stress is associated with higher absence and staff turnover and lower job satisfaction (Torrington et al, 2005). The mitigation and management of workplace stress has, in recent years, assumed a prominent position on the HRM agenda.

3. Learning, Older Workers as Learners and the Aging Workforce

Cognition refers to the various mental processes involved in gaining knowledge and comprehension; thinking, remembering, knowing, judging and problem-solving. The output of the cognition process is learning, so if cognition is impaired, so too is the learning.

Learning can be usefully defined as ‘a qualitative change in a person’s way of seeing, experiencing, understanding and conceptualising something in the real world’ (Marton and Ramsden, 1988, in Harrison, 2009: xxvii); importantly, learning is also the process by which change occurs (Harrison, 2009). Without learning, on individual, team and organisational levels, change cannot be achieved. Research into the production of new brain cells (neurogenesis), suggests production of new neurons is inhibited under stress. Gage (2003) considers neurogenesis is crucial to making
sense of, and adapting to, new experiences. Thus stressed individuals may find it harder to adapt and learn new processes and information, jeopardising the very change outcomes that the organisation seeks.

The idea that cognitive ability reduces as people age is not new, but it is contentious. Supporting this view, Speed Deficit Theory suggests that in older learners there is a measurable decreased speed of performing mental operations when compared and contrasted with younger learners (Salthouse, 1996). Dennis and Cabeza (2008) describe two mechanisms which account for this phenomenon; firstly, after about the age of fifty, deterioration of the insulating myelin sheaths that surround connective neural axons slow nerve impulses in the brain. Secondly, in the older brain loss of connective axons force the brain to compensate by utilising other less direct neural routes. Decremental information-processing speed has consequential affects on all other mechanisms (Salthouse, *op cit*; Birren, 1965), including working memory and sensory functions.

Volumetric MRI scanning of the brain shows ‘functional compensation’ (Dennis and Cabeza, 2008), that increased use of the dorsolateral prefrontal cortex compensates for age-related shrinkage of the front cortex and is associated with age-related declining working memory (Park and Payer, 2006). However, these cognitive changes increase the time taken for completion of cognitive tasks when compared with younger people, and therefore there are implications for providing effective learning for older people, in terms of how material is presented (Newton *et al*, 2005; Moseley and Dessinger, 2007) and the learning environment (Kanfer and Ackerman, 2004).

It is therefore possible that during organisational change-related learning, older learners may become aware of slowing of their cognitive processes relative to their younger counterparts, increasing the mental and emotional pressure on them (Newton *et al*, 2005) thus producing greater insecurity and perceptions of threat, both of which increase stress.

**Hypothesis 1 – Older people experience higher levels of stress during organisational change than younger people.**

A contrasting view is that slowing cognition in older people may be masked by compensatory prior experience; research (Charness *et al*, 2001, in Craik and Salthouse, 2008: 457) shows,

‘*for novice learners (those with minimal [previous] exposure...) older learners are at a significant and substantial disadvantage in terms of speed of learning, degree of retention, and speed / accuracy of performance after training ... for expert learners (those who already have high levels of skills) the differences between older and younger adults are attenuated’*

The Seattle Longitudinal Study (Willis *et al*, 1994; Schaie *et al*, 2004) has tested the same group of 6000 people, from 20 to 90 years of age, every seven years since 1956. Results indicate that on average, people function better on four of six cognitive tests in middle age (from the age of about 40 to 65) than at any previous time, including when they were in their 20s; in agreement with Salthouse (1996), they found that perceptual speed and numerical ability do indeed
decline with age, however vocabulary, verbal memory, spatial orientation and inductive reasoning do not see peak performance until between the ages of 40 and 65.

Willis et al (1994) argue that as people age, they improve in their ability to manage and manipulate multiple tasks and demands on their skills and experiences, and that they competently and with less stress carry out more complex and intuitive tasks than younger people, using their greater life experience. These compensatory organisational and cognitive skills mean that older people are better able to manage the complex and multiple tasks associated with organisational change, and will be less stressed by it.

**Hypothesis 2 – There is no appreciable difference in stress levels following change across old and young age groups.**

In addition to the physiological effects of aging on cognitive processes, older people may be negatively affected by both motivation and psychological factors; they may have doubts about their ability, their self-efficacy and this may be so debilitating that it prevents learning even in those who have the ability to do so (Gist, 1989). This is further described by Newton et al (2005: p 25), who state that’

> ‘Older workers erect their own barriers to training, which can be broadly categorised as either fear or over confidence. Their fears surround their own beliefs about their ability to learn new concepts and tasks; the over-confidence stems from their own experience in their job and their identification of a lack of need of training’

Guthrie and Schwoerer (1996) also suggested there is a link between age and self-perceptions of efficacy in learning and training; older people feel they are less able to cope with the demands of training, and feel less capable of learning than their younger colleagues. Guthrie and Schwoerer (op cit) further suggest that if people have not had recent learning experience, a situation more likely to occur in older workers, they tend to find learning harder which in turn makes them more afraid of learning and so they find the whole learning experience more stressful.

Thus it can be argued that older workers who are experiencing high learning demand during organisational change, will therefore more frequently identify this learning pressure as a stressor by older people than those in younger age groups.

**Hypothesis 3 – Older workers are more stressed by the learning demands of organisational change than younger workers**

The effort cost of learning may also be higher in older people; Poffenberger (1942) observed almost 60 years ago that as cognitive ability declines with age, the effort required to achieve the same cognitive outcomes increases, and that other factors such as work demand and prior knowledge, and compensatory factors affect the final outcome. Eventually, this effort and the stress it causes may prove greater than the perceived benefits, demotivating older workers to even try (Kanfer and Ackerman, 2004).

More recently, Guthrie and Schwoerer (1996) suggested older people feel less able to cope with the demands of training and less able to learn than their younger colleagues, a feeling which is increased if they have not had recent learning
experiences. This lack of confidence in their learning-ability is often reinforced by commonly-held societal perceptions of older people (Geddes, 2006). In older people, these factors may present as change-resistance attitudes and/or stress as a result of heightened change-related learning pressure.

A lack of confidence in their learning ability experienced by older people is often reinforced by commonly-held stereotypical societal perceptions of older people, their attitudes and abilities, which Geddes (2006) comments is the product of the conceptualised ‘generic’ adult in all stages of adulthood. Baack et al (1991) argued that older people are unfairly stereotyped regarding their attitude toward change and innovation, in which they are commonly regarded as slow to learn and generally change-resistant. Thus, in older people, lack of confidence in their own ability to learn may be the result of cultural influences as much as self-perceived limitations and deficiencies, and change-resistance may be due to a fear of having to learn. This was recognised in a study by Newton et al (2005: 22) which argues that both physiological and psychological barriers to learning, if not appropriately managed will lead to older learners developing ‘dysfunctional coping styles and anxiety’. Further, such views, if held by older people, may have affected the responses this group gave to questions about their learning experiences and perceptions of learning-based stress.

This led to a very small exploratory, qualitative study of employees’ perceptions of the change event and the training they received. Furthermore, it served to gain an indication of whether or not employees hold age-based stereotypical views about their own learning ability, or that of their colleagues.

These contrasting views, which agree that cognitive aging occurs but vary in their opinion of the practical, and therefore organisational effects of these changes and whether their sources are physical or psychological or a combination of both, raise some interesting questions regarding HRM and L&D policy and practice. In particular they present challenges about how best to provide effective, non-discriminatory learning in an aging workforce. The answers to these questions may be paramount in ensuring critical competencies are maintained and that older workers remain healthy and fully productive in the face of often unrelenting change.

4. Introduction to this Study

Whether and how age affects change-related stress, and whether this stress is caused by the need to learn to achieve change as explored in this study, is complementary to the subjects of other studies there being a paucity of research in this area. This study therefore contributes by expanding on what is known about the effects of change on discrete populations. This includes both the real physical and psychological effects, and those which may result from stereotyping. This greater understanding will enable organisations undergoing change to identify employees most at risk of experiencing stress, allowing any risk of harm to be mitigated.

4.1. Defining the ‘Older Worker’
The age at which aged-related cognitive decline is noticed or becomes problematic varies; we have seen how although decline is apparent in controlled laboratory tests which negate environmental support, task and environmental familiarity masks effects so people deny they are affected. Also the age at which people adopt ‘older’ characteristics is affected by attitude, general health, level of education, previous use of cognitive function and genetic factors (Willis and Martin, 2005:viii-ix). For the purposes of this work, an older worker is defined as someone over the age of 45 years, and a younger worker as someone below the age of 29.

4.2. The change event

This study is conducted within a national distribution organisation, referred to throughout as ‘Organisation A’. They operate from a warehouse and distribution centre in the Midlands. Around 150 people work at this location, including Distribution Centre Operatives (DCOs), management and operations support staff. In July 2010 a new Warehouse Management System (WMS), Red Prairie was deployed. The learning load for staff to successfully implement this was high. In an interview, a manager commented on the degree of change involved and the sheer amount of new material staff had to learn:

‘the change for the staff was enormous, and they had to learn almost everything again – there are new processes, new paperwork, equipment to be used, new names for both things and processes, and their work sequences have changed beyond all recognition – it’s like they went home from work one day and then when they came in the next day they were working for a completely different company. Even team structures had to change as responsibilities moved from one work area to another!’

The effect of these changes on the workforce varied according to their role. However, almost every member of the workforce was affected to some degree and training sessions were planned for everyone affected.

Change inevitably involves learning new things. It may also involve working with new teams and structures. The earlier quotation by the manager reveals the extent of the change, and thus the learning load on the staff associated with the implementation of Red Prairie. Red Prairie is an ‘off-the-shelf’ application, meaning that work sequences and data flows are hard-code and cannot be changed – the organisation must do all the necessary changing to fit the system, including its processes and terminology. This necessitates a complete review and adaptation of work and information streams, as tasks are differently sequenced according to the rigid input and output sequences of the system, and many of the terms with which people were familiar were changed to match those used by Red Prairie. Manual processes became obsolete overnight, replaced by system-based processes, often carried out by different people in different departments and inputting information at different stages in the overall warehousing management process.

The result, as highlighted by Organisation A’s manager, was that for many people the effect was one of appearing to leave a familiar job one day to return the following day to a completely transformed organisation; almost all aspects of their jobs had to be re-learned – a huge learning load, and as the entire operation, from purchase order management to
personnel and materials handling equipment management (fork and scissor lift trucks) are absorbed into the new system, thus it affects almost everyone in the depot.

5. Methodology

This study undertook a longitudinal mixed-method study of stress before and after a major strategic IT deployment in a Midlands warehousing operation. Data was gathered by questionnaire on two occasions, T1 in June 2010 (n=80) and T2 in September 2010 (n=77), using convenience sampling of all categories of employees at work over a 3-day collection period. Responses, which were voluntary, were then analysed in three age groups; under 29 years, 29 to 44 years and 45 years and over. These categorisations were determined after extensive reviews of literature on aging (e.g., Moseley and Dessinger, 2007; Willis and Martin, 2005; Park et al, 1996; Willis et al, 1994; Schaie et al, 2004) that suggested that age-related decline was evident from about 40 years onward. Therefore, by comparing people of 45 years or older with the youngest workers, aged under 29 years, differences are more likely to be apparent and measurable.

The independent variables measured were gender, age, educational attainment, recency of learning and social support. Background stress was measured and found to be high at both T1 and T2, so was excluded from the analysis as it was a constant. The dependent variables were self-perceived stress, using Cohen’s (1983) Measure of Perceived Stress (PSS), and the incidence of stress-related psychosomatic illness or symptoms using the Cohen-Hoberman (1983) Measurement of Physical symptoms (CHIPS). Both are self-report measures.

The PSS contains 10 questions about recent manifestations of stress, some of which were negatively stated to measure how stress people feel they are. An example is, ‘In the last month, how often have you felt that you could not cope with all the things you had to do?’ The CHIPS contains 33 questions about how troublesome those physical symptoms commonly-associated with stress have been, such as sleep problems, headaches and indigestion. Both measures use 5-point Likert-type scales, and have acceptable Cronbach’s Alpha scores. It is also worth noting that to provide an objective measure to triangulate the CHIPS scores, the organisation’s sickness absence records were analysed for the period.

To assess which factors were found most stressful at T1 and T2, respondents gave information about perceived stressors by ranking a selection of possibilities in order of perceived stressfulness. The options for stressors were loosely based on Ganster and Murphy (2000), who gave examples of stressors in the work domain. Choices also included ‘The amount of things you have to learn and remember’ and ‘Not being confident about how to do your work’. These grouped stressors, which we called ‘learning demand’ indicated that respondents were aware of increased learning load or that their current level of knowledge was inadequate and further learning necessary. Factor analysis of the T2 data returned an overall Cronbach’s Alpha of 0.68, closely approaching acceptable reliability.
Respondents were asked if they were prepared to give a short anonymous telephone interview after completing the questionnaire, and if so to give a mobile phone number. The purpose of these interviews was to explore individual perceptions of the change experience and the associated learning and training, as well as providing rich background data about the organisation, teams and individuals. In total, 10 interviews were carried out. Subjects were aged between 21 and 52 years. Of the subjects, 6 were male and 4 female. During these interviews, cultural or personal stereotypical beliefs about each respondent’s own learning ability from both self-perception and from the perspective of their colleagues were identified and explored. Interviews were carried out after the T2 data collection.

SPSS v.16 was used to produce descriptive statistics for T1 and T2, and looked for associations between age and stress levels, both self-perceived and that presenting as stress-related illness by calculating bivariate coefficients of correlation. Perceived stressors were similarly analysed, to look for possible associations between age groups and perceived stressors. Thus, I looked for evidence of age-related stress during organisational change, and sought a further link between stress and learning. Interviews were manually analysed for constructs.

6. Findings
6.1. Testing Hypotheses 1 and 2
Hypothesis 1 predicted that older people experience higher levels of stress during organisational change than younger people, while Hypothesis 2 predicted that there are no appreciable differences in stress levels across old and young age groups following change.

6.1.1. Descriptive Statistics
At T2 many of the departmental and functional managers stated they were ‘too busy’ to complete the second copy of the questionnaire. This group were clearly working under heightened workload, which could have affected their responses had these been captured. That fact that some staff were working under such conditions had been pointed out by my contact within the organisation, who suggested that data collection could be delayed to allow for this. However, to delay data collection until stress had reduced would, I felt, be contrary to the purpose of the study. This variance in samples between T1 and T2 may well be significant, and can be seen in the analysis of respondents by age group (Table 1); these managers were in Group 2, and their absence has meant that T2 samples are disproportionally biased toward Groups 1 (under 29 years) and Group 3 (over 45 years) when compared with T1 samples.

<table>
<thead>
<tr>
<th></th>
<th>T1</th>
<th>T2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>Group 1 – Under 29 years</td>
<td>25</td>
<td>31.2</td>
</tr>
<tr>
<td>Group 2 – 29 to 44 years</td>
<td>35</td>
<td>43.8</td>
</tr>
<tr>
<td>Group 3 – Over 45 years</td>
<td>20</td>
<td>25.0</td>
</tr>
<tr>
<td>Total</td>
<td>80</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 1 - Analysis of respondents by age group
6.1.2. Coefficients of Correlation for PSS and CHIPS Scores at T1 and T2

Coefficients of correlation between scores for both Cohen’s (1983) Measure of Perceived Stress (PSS) and the Cohen-Hoberman (1983) Inventory of Physical Symptoms (CHIPS) and all independent variables were calculated at T1 and T2, to identify and quantify the strength of any relationship between age (or any other independent variable), and perceptions or symptoms of stress. There was a strong positive correlation between the PSS scores and the CHIPS scores at T1 (0.438, p<0.01) and at T2 (0.337, p<0.01), supporting the validity of the measures. There was a moderate positive correlation between gender and CHIPS score at T1 (0.229, p<0.05) and between gender and PSS score at T2 (0.300, p<0.05), indicating there is a stronger relationship between females and stress than between males and stress.

There was a large positive correlation between age and how recently people studied, at T1 (0.498, p<0.01) and at T2 (0.526, p<0.01). These are the only statistically significant correlations detected. No statistically significant correlation between age and stress levels was found, at either T1 or T2.

6.1.3. Comparison of Mean PSS and CHIPS Scores at T1 and T2

A comparison of mean PSS and CHIPS Scores at T1 and T2 was carried out, which showed clear differentiation by age group (Table 2):

<table>
<thead>
<tr>
<th>Age Group</th>
<th>T1 PSS</th>
<th>T2 PSS</th>
<th>Δ</th>
<th>T1 CHIPS</th>
<th>T2 CHIPS</th>
<th>Δ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1: Less than 29 years</td>
<td>Mean</td>
<td>27.44</td>
<td>27.5</td>
<td>0.06</td>
<td>19.36</td>
<td>17.07</td>
</tr>
<tr>
<td>N</td>
<td>25</td>
<td>30</td>
<td>25</td>
<td>29</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Std. Dev</td>
<td>6.124</td>
<td>7.468</td>
<td>15.591</td>
<td>13.923</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group 2: 29 to 44 years</td>
<td>Mean</td>
<td>26.66</td>
<td>26.58</td>
<td>-0.08</td>
<td>15.66</td>
<td>14.6</td>
</tr>
<tr>
<td>N</td>
<td>35</td>
<td>26</td>
<td>35</td>
<td>25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Std. Dev</td>
<td>6.73</td>
<td>6.113</td>
<td>14.307</td>
<td>11.361</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group 3: 45 years and over</td>
<td>Mean</td>
<td>24.05</td>
<td>24.29</td>
<td>0.24</td>
<td>13</td>
<td>17.81</td>
</tr>
<tr>
<td>N</td>
<td>20</td>
<td>21</td>
<td>20</td>
<td>21</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Std. Dev</td>
<td>6.108</td>
<td>6.466</td>
<td>11.841</td>
<td>20.056</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>Mean</td>
<td>26.25</td>
<td>26.31</td>
<td>0.06</td>
<td>16.15</td>
<td>16.45</td>
</tr>
<tr>
<td>N</td>
<td>80</td>
<td>77</td>
<td>80</td>
<td>75</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Std. Dev</td>
<td>6.45</td>
<td>6.804</td>
<td>14.197</td>
<td>15.025</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2: Comparison of means for PSS and CHIPS scores at T1 and T2, by age group

At T2, Age Group 3 (45 years and over) recorded a very small increase in their mean PSS score, but a much larger increase in mean CHIPS scores (Increase in mean PSS = 0.24, increase in mean CHIPS = 4.81), whereas Groups 1 and 2 showed either no appreciable increase, or even a small decrease in PSS or CHIPS scores between T1 and T2. (Figs 3 and 4 overleaf). This suggests that older people’s stress-related symptom levels, when measured before and after a change event, increase more than younger people’s during the same change process. As the data show, this effect is...
more marked for the CHIPS measure of psychosomatic symptoms than for the self-reported perceptions of feeling stressed (PSS). At T2, the CHIPS scores for age Group 3 were the highest (mean =17.81) of all age groups. This clear difference between the younger people in Group 1 and the older people in Group 3 provides evidence that older people are more affected by stress during organisational change than their younger colleagues. Thus Hypothesis 1 is supported.

### 6.1.4. Analysis of Sickness Absence

Sickness absence data for the site for the period May 2010 to September 2010 shows an increase in absence during the immediate post-change period in July and August (to 2.2% and 3.4% respectively) with a return to a lower, closer to pre-change level by September 2010 (2.0%). Values are given in hours absence, and expressed as a percentage of the total possible work hours in the period (Table 3)

<table>
<thead>
<tr>
<th>Month</th>
<th>Total Hours Absence</th>
<th>Total Possible Hours in the Period</th>
<th>Absence %</th>
<th>Indexed %</th>
</tr>
</thead>
<tbody>
<tr>
<td>May-10</td>
<td>713</td>
<td>39312</td>
<td>1.8</td>
<td>100.00%</td>
</tr>
<tr>
<td>Jun-10</td>
<td>680</td>
<td>43648</td>
<td>1.6</td>
<td>88.89%</td>
</tr>
<tr>
<td>Jul-10</td>
<td>986</td>
<td>45056</td>
<td>2.2</td>
<td>122.22%</td>
</tr>
<tr>
<td>Aug-10</td>
<td>1628</td>
<td>47344</td>
<td>3.4</td>
<td>188.89%</td>
</tr>
<tr>
<td>Sep-10</td>
<td>952</td>
<td>48576</td>
<td>2.0</td>
<td>111.11%</td>
</tr>
</tbody>
</table>

Table 3: Sickness absence data for Organisation A, May 2010 to September 2010. Source: Organisation A Human Resources Information System

The pattern of sickness absence appears to indicate a rise in absence levels concurrent with the start of pre-deployment training and peaking during the post-deployment period. This contrasts with the overall mean scores for self-reported symptoms in the CHIPS questions, which showed only a slight increase between T1 and T2 (from 16.15 to 16.45).

However, the absence data do not exclude long-term absence so the cause of the rise during July and August 2010 cannot be conclusively determined, and as data relates to the entire population no conclusions can be made about the age breakdown of absentees. Further analysis would be needed to exclude long-term or extraordinary sickness, and the levels of absence for the different age groups identified before this can be used to support either Hypothesis 1 or Hypothesis 2.

### 6.2. Testing Hypothesis 3

Hypothesis 3 predicted that older workers will be more stressed by the learning demands of organisational change than younger workers. To test this hypothesis, respondents were asked to identify, from a list, the factors they found most stressful in their working life by rating items according to self-perceived stressfulness.
6.2.1. Coefficients of correlation between age and stressors at T1 and T2
At T1 there was a significant positive correlation (0.223, p<0.01) between age and the perception of Production Targets as stressful. There are no significant correlations between age and any other variable at T1. There are, however, many other significant correlations between variables including a significant correlation (0.507, p<0.05) between ‘The amount you have to learn and remember’ and ‘Not feeling confident about how to do your work’ supporting the construct validity of these items. At T2 there are no significant correlations between age group and any stressor. The positive correlation between ‘The amount you have to learn and remember’ and ‘Not feeling confident about how to do your work’ is less strong at T2 than at T1, although it remains significant (0.409, p<0.05).

6.2.2. Comparison of mean scores for stressors between T1 and T2
A comparison of mean scores recorded for all stressors, analysed by age group at both T1 and T2 was used to identify variances in perceived stressors between age groups and across the change event. Fig 1 below shows means scores by age group and for the whole sample for each stressor at T1 and T2,

![Fig 1: Means scores for perceived stressors, at T1 and T2, for the whole sample](image)

Taking the sample as a whole, no stressor showed an increase in mean scores between T1 and T2. All means recorded for stressors either remained at about the same level or reduced between T1 and T2, most noticeably for ‘Production Targets that have to be met’ and ‘Workload too large / not enough time to do work’.
Fig 2: Means scores for perceived stressors, at T1 and T2, analysed by age group

When comparisons between age groups (Fig. 2, above) are made, differences are apparent and it becomes clear that compensatory variations between age groups for the same stressor are the reason for the unchanged overall levels. For example, in the mean score for ‘Not being confident about how to do your work’ both younger people in Group 1 (Blue bars) and older people in Group 3 (Green bars) showed increases between T1 and T2 (Group 1: from 0.68 to 0.90; Group 3: from 0.58 to 0.71). Group 2 (Red bars), the mid-range of age, reported a large decrease at T2 for the same stressor (0.80 to 0.48) so the resultant overall mean remains unchanged at 0.71, despite the contrasting age group means.

Groups 1 and 3 (blue and green bars) reported that they found ‘Boring work’ much less stressful at T2 than at T1 (Group 1: 1.12 to 0.77; Group 3: 1.16 to 0.71) whereas Group 2 (red bars) reported a large increase in stress from ‘Boring Work’ between T1 and T2 (0.8 to 1.16).

Mean scores for ‘Your relationship with your boss’ appear to change differently according to age group; In Group 1 (blue bars), mean scores indicate stress decreased between T1 and T2 (0.96 to 0.77), in Group 2 (red bars) they remained about the same (1.14 at T1 and 1.16 at T2) and for Group 3 (green bars), an increase in scores indicates more stressful relationships with people’s boss at T2 than T1 (0.79 to 0.95).

Inter-colleague relationships, by contrast appear to have improved at T2 for both Groups 1 and 3 (blue and green bars) with reductions in mean stress levels for this factor (Group1: from 0.92 to 0.60; Group 3: from 1.11 to 0.57) but remained about the same for Group 2 (red bars (from 0.66 to 0.68)).

Another stressor that showed age group differences between T1 and T2 is ‘Workload too big – not enough time to do your work’, wherein Groups 1 and 2 (blue and red bars) recorded a reduction in mean stress levels attributed to
workload between T1 and T2 (Group 1: from 1.28 to 1.13; Group 2: from 1.53 to 0.76) but the older people in Group 3 (green bars) recorded an increase for the same stressor (from 1.11 to 1.24).

For the ‘Learning Demand’ Stressors Group 3 (green bars, over 45 years) showed a moderate increase in means scores at T2 for ‘The amount of things to learn and remember’ (1.00 to 1.21), while Group 2 (red bars) showed a large decrease (1.26 to 0.68) and Group 1 (blue bars, under 29 years) remained about the same.

Overall, although the younger people in Group 1 (blue bars) report greater stress at T2 from lack of confidence about how to do their work, they do not feel under greater stress from the amount they have to learn and remember during the change event which remains about the same level.

By contrast, it appears that at T2, those older employees in Group 3 (green bars) like the younger age group (blue bars) are less confident about how to do their work than at T1 but additionally their perception is that they do experience greater stress as a result of the amount of things they have to learn and remember during organisational change. Therefore Hypothesis 3 is supported.

6.3. The stereotypical beliefs about age held by employees of Organisation A.

Manual analysis of the 10 interviews yielded four areas of interest. These were important in understanding the experience of change for the employees of Organisation A and what, if any, stereotypical beliefs about the ability of people of different ages to learn may be held. These were: the extent of the change personally experienced and the learning pressure associated with it; perceptions of training received; how each person feels about their own learning capability compared with their colleagues; and finally, how each person thinks their colleagues view them as learners.

The extent of the change: Interview responses confirmed the high learning demand. 80% of interviewees cited changed processes and nomenclature as being difficult. One typical response was:

‘There was a lot to learn, and as I was moving into the role so I had to pick up a huge amount especially as the system had a few problems at first. My role was [job title] for [organisation] so when Red Prairie went live it was a steep learning curve, you just had to start again’

(Male, aged 25-30)

However, the opinion was also expressed that the underlying principles of the logistics operation remained unchanged, and that this made the pressure to learn novel information manageable; that prior experience was underpinning and supporting the person in learning the new system:

‘The principles are the same – inbound, store, pick and ship ... I’ve been in logistics for 20 years, I have an operational background, so it’s not so much different for me’

(Male, aged 35-40)
The training received: There was no perceptible pattern to responses about training, in terms of age or gender of interviewees. A favourable or unfavourable view of the training received appears to be random. However, this is a very small sample of employees and if the research were extended it might be possible to determine whether any particular group or demographic tends to prefer or have greater difficulty with specific training methods or approaches.

Self-perceived learning ability and colleagues’ views of learning ability: Here, stereotypical views were expressed in both areas. One older worker admitted they felt they were slower to learn, taking longer to master skills. A younger worker clearly expressed age-related views of others’ learning ability:

‘People my age were used to computers ... the older people for whom using computers wasn’t second nature found it took longer’

(Female, aged 25-30)

One young employee said her colleagues thought she was a quicker learner because of her age:

‘... others/colleagues] took more time. One person in particular has to learn everything about something before they can move on – they always make jokes about, “these youngsters, they know what they’re doing on computers!”’

(Female, aged 25-30)

Another, older, employee said:

‘some of them [her colleagues] have a laugh because I’m older and they’re much quicker on computers, but I don’t think they really mean it’

(Female, aged 45-50)

These views indicate a degree of age stereotyping, by both younger and older people. However, these opinions were expressed in a good-humoured tone with no expression of resentment or feelings of victimisation or detriment having been suffered, and there was nothing said to indicate that any of the older people had based their questionnaire responses on stereotypically-held views, or that their responses had been influenced by any such views.

On the contrary, what came through clearly from almost everybody was team spirit, and a willingness to help slower colleagues. One person said:

‘When I started my new job, people said, “Don’t worry, everyone makes mistakes”’

(Male, aged 50 to 55)

This was not confined to older interviewees. Another, younger person said:

‘I found it easier … because I’d been involved in the testing, but there were always loads of colleagues who would help you’

(Male, aged 20 to 25)
7. Discussion

7.1. Does age affect the stress experienced by employees during organisational change?

The comparison of mean PSS and CHIPS scores between T1 and T2 provides evidence that older people, while not perceiving themselves to be more stressed at T2 than at T1, report a marked increase in stress-related psychosomatic symptoms at T2 and go from being the least stressed group before the change event, to the most stressed afterward. As the purpose of this study was to examine whether stress levels change by different amounts during organisational stress according to age group, these findings are highly significant. Whilst these findings suggest there is a link between age and stress during organisational change, it must be pointed out this was a pilot study, intended as the precursor for more extensive and detailed work.

Seyle’s (1976) research shows the adverse side-effects of stress follow a three-stage course, and the onset and severity of symptoms relates more to the duration of the stress than the degree of strain produced by the stressors. High levels of background, non-work stress were common in this study, to such a degree that this was excluded from analysis. However, if this is factored into Seyle’s (1976) three-stage model it may have had the effect of accelerating people through Stage 1 (short-term muscle tension, increased heart, blood pressure and respiration rate as a result of adrenaline reaction) and Stage 2 (anger, anxiety and fatigue) to stage 3 when people experience physical and mental exhaustion and stress-related illnesses such as headaches, insomnia, stomach upsets. This could be one explanation for the apparent rapid onset of stress-related symptoms between T1 and T2. However, it does not explain why older people seem to be affected whereas young people are not. One possible clue to the reason for this is provided by Kohler et al’s (2006) research, wherein it was determined that organisational change is positively associated with challenge and uncertainty appraisal, as suggested by Lazarus and Folkman (1984). While Kohler’s research looked specifically at organisational change and gender, it is also possible that people of different ages appraise change differently and that older people perceive change as more threatening than their younger colleagues, particularly if they fear for their job if they fail to learn. This concurs with Newton et al’s (2005) view that older people experience greater insecurity and perceptions of threat during change as they are more aware of cognitive slowing relative to their younger colleagues. Thus the pressure of learning demands is greater for them and is therefore acting as a mediating variable in the relationship between age and stress:

![Diagram](attachment://diagram.png)
Poffenberger’s (1942) concept of increased cognitive cost associated with aging is also relevant in this context, and would account for the higher post-change stress-related symptoms experienced by the older group. Another possible reason is that although as people age they are generally less stressed, when stress does occur their resilience to it is reduced and they are simply quicker to move into the stage where stress-related illness is experienced whilst not cognitively recognising that they are stressed. This possibility is an important area for HRM policy and practice, and line managers should be aware of this. This is also an area that could be valuably examined in future research.

7.2. Triangulation of research findings

The analysis of the company sickness absence data was disappointing in that the data provided by the company lacked sufficient detail to be able to ascertain whether or not the increase in sickness absence during the immediate pre- and post-change period was affected by long-term sickness. Also, there were no demographic data provided about absentees to enable any sort of analysis by age or any other variable to be made. The increase could be attributable to so many factors; seasonal illness such as hay fever, a small number of long-term sicknesses, greater sickness absence being taken when in reality people have childcare problems during the school holidays as well as, of course, a genuine increase in illness, which may or may not be stress-related. This does highlight the importance of an effective reporting capability of a HRIS; without this neither forward manpower planning nor effective absence management can be achieved. Relative to this study, without much more information and analysis, these data are not particularly useful, but the pattern of absence does indicate that further analysis could be rewarding and would therefore be well worthwhile.

7.3. Experience and its effect on stress in older workers

Prior experience, which has been shown empirically to compensate for cognitive slowing in older people (Charness et al, 2001; Willis et al, 1994) was cited during the interviews as being a positive factor in learning the new system. This view strongly echoes that of Schulz and Roßnagel (2009) who described how prior specialised and general life experience can relieve the pressure of learning. Strong workplace social support, which similarly has been shown to reduce work-related stress (Callan, 1993; Gerpott, 1990) was also revealed within the interview responses. Moreover, social learning theories argue that ‘learning requires a social setting to occur and to be applied’ (Reynolds et al, 2002: 25) and the true value of coaching and mentoring as social learning vehicles becomes apparent.

This was expressed especially in helping colleagues to learn new materials, and evidence that those with greater industry experience used this to cope with organisational change. Therefore these factors are likely to be mediating variables to any relationship between age and change-related stress:
As explained, although there was less support for Hypothesis 2 in the quantitative data analysis, these interview responses indicate that this is likely to be a rewarding area for further specific research.

**7.4. The effect of age on perceptions of learning as a stressor**

Hypothesis 3, which predicted that older workers will be more stressed by the learning demands of organisational change than younger workers, was supported by this study. That older people take longer to learn new things (Charness *et al*., 2001), and have less resource for working memory and less efficient sensory function (Salthouse, 1996) as a result of decreased processing speed, is well-documented and accepted as part of the normal physiological and neurological aging process. Newton *et al* (2005) and Poffenberger (1942) asserted that older people would be more stressed by the increased load on their learning resources that would result from these declines.

On the basis of the results of a comparison of mean scores for ‘The amount of things to learn and remember’ and ‘Not feeling confident about how to do your work’, which indicate that older people are more stressed by both of these factors when reflecting on the immediate post-change period than before the change event, Hypothesis 3 appears to be supported, although more research with a larger sample is necessary to provide stronger evidence.

**7.5. Stereotyping by age**

The final part of this study explored a small number of opinions about the change event, the training they had received and both self- and colleague perceptions of learning abilities. The purpose was to identify any stereotypical or cultural belief about age and how this affects someone’s learning efficacy and, more importantly, whether or not any such beliefs had biased the responses older people had given about their perceived stress.

The interviews confirmed the manager’s view, that the particular change event happening at Organisation A involved learning many new things. However, no interviewee said that they felt completely overwhelmed by the amount they had to learn, or that they felt they had failed to achieve the required learning, but this may be due to a natural reluctance to admit inadequacy, even though the confidentiality of the interview was assured. This reluctance may be a result of commonly-held views of the consequences of failure on esteem and compensation; people feel they are paid to succeed, for work done well, not for failure (Serrat, 2010) so it must be borne in mind that interview responses may have been biased. Also, people may hold more favourable views of their own performance and ability and the speed that they learned the new material associated with the change.

In recognising that age changes how people perform when learning new things, there was acceptance and acknowledgement of slower cognition, and the need for learning to be at a slower pace, with more opportunities for practice if older people are to be effective learners. This view is concurrent with Meadows (2003) and Moseley and
Dessinger (2007), who opine that older workers are best helped to learn by using small steps, building on existing experience and allowing plenty of opportunities for practice. However, In contrast to Newton et al’s (2005) findings, none of the small number of interviewees expressed any lack of confidence in older people’s ultimate ability to learn what was needed of them, or that they felt their colleagues held such views.

**The Implications of these findings for HRM and Learning and Development in Organisations**

The knowledge gained in this study potentially places a Duty of Care on employers under the Health and Safety at Work Act, 1974, to control and mitigate any harmful effects if these are predictable. In this respect, these findings mean that an increased likelihood for stress to occur in older people during organisational change is predictable. Further, if older peoples’ need for learning to be slower-paced and for more practice to be provided is not understood and accommodated, and this results in greater stress or some other detriment being suffered, then harm and / or indirect discrimination may have occurred. This might happen if, for example, the person feels intimidated or humiliated, or does not master learning as quickly as others. In an extreme case, an unwitting line manager might use performance management or disciplinary processes to deal with an older employee who is not meeting targets, despite having received generic training, without first questioning whether the training met the needs of that person. With the scrapping of the Default Retirement Age in 2011, this spectre takes on real substance, as does the alternative possibility that if proven that older people experience more stress in a fast-paced changing organisation, this is itself could be used to justify the retention of a contractual retirement age.

It is not only the legislative implications that should concern an organisation; the known effects associated with stress are costly and damaging to the employer brand - higher absence and turnover, lower job satisfaction and poor employee relations. The cost of these to the organisation may usefully be used to argue the business case for implementing stress management recommendations, but in order to do so changes may be needed to the HRIS to facilitate the measurement, analysis and costing of these adverse effects. Absence, and why people leave the organisation need to be well understood if the level of stress-related cost is to be monitored.

There are two potential issues which should be addressed, on both HRM policy and practitioner levels; if older people are generally more stressed by the change process, a general Change Management process review is necessary. However, if it is the process of learning new materials associated with the change that causes the stress, then the training and learning and development practices in an organisation must be scrutinised to ensure these meet the needs of all employees, including older people. In reality, both approaches are likely to be needed.
8. Limitations and future directions

The lack of significant correlations between either self-perceived stress or self-reported physiological symptoms of stress at either T1 or T2, could have arisen because of factors specific to this study, in particular the dissimilarities of the T1 and T2 samples because of the middle managers who declined to take part at T2. Adding weight to this argument is the fact that this study failed to replicate many of the findings of previous studies. The exception was those of Hendrix et al, (1994) and Zappert and Weinstein (1985), who identified women are more affected by stress than men when subject to the same stressors.

It is also possible that, even though confidentiality was assured, people may have been reluctant to admit they were not coping well, or indeed, judged and reported that they were coping better than they really were. This phenomena is well-described by Bandura (1997) who conceptualised self-efficacy as a situational construct, and as Lazarus and Folkman (1984) point out, individual personality characteristics will influence people’s appraisal of the situation and how well they have coped with stressors. As highlighted by Cohen et al (1983) the fact that both measures are self-reporting may have led to bias, either from people deliberately mis-reporting or as a result of mistaken memory.

It must be borne in mind that this work, which was intended as a pilot study was limited in its scale. We undertook only a very small number of interviews, and therefore any opinions expressed cannot be considered to be generalisable across the entire sample. It was intended merely to obtain a ‘flavour’ of how people feel about the recent change event and how it was managed, and also how they and their colleagues fared during the change process, in particular their learning experience. It also served to indicate whether or not people hold any stereotypical perceptions about age and someone’s ability to learn according to their age. Further work on a larger scale, focusing on multiple sectors and organisations is necessary to expand on this knowledge and to determine if the findings can be generalised.

Many factors are known to affect stress, including social support mechanisms. Callan (1993) and Gerpott (1990) found that those who had the best social support, both at home and at work were the least likely to suffer from stress. The strong feeling of teamworking and team loyalty that emerged during the interviews indicates that certainly at work, there are strong support mechanisms in place. This illustrates the value of teamworking and effective diversity management within organisations. Strength of social support at work was not measured in the questionnaire, so it is not possible to quantify whether or not this has impacted on the stress levels measures at T1 and T2. This is likely to prove a worthwhile focus of future studies.

Guthrie and Schwoerer (1996) demonstrated that learning is easier and less stressful if it practised regularly, and those who had not learned for some significant time found it harder and therefore more stressful, when required to learn new things. Although there was a large positive correlation between age and when people studied, thereby indicating that
many of the sample had left education at the ‘normal’ time and had not undertaken any learning since, no significant correlations were found between how long ago people studied and stress, so Guthrie and Schwoerer’s (1996) findings were not replicated; it would reasonably be expected that as a significant correlation between age and recent learning was found by this study, so too would be the second step in this link, that between age and stress. That this was not found further supports the argument that factors peculiar to this study have impacted on the results of correlation analysis, and suggests that further work is necessary to better understand how these factors affect stress in older learners.

9. References


