



**Prifysgol Cymru**  
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Exploring the use of gamification applications for improving workplace  
resilience

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## **DECLARATION**

This work has not previously been accepted in substance for any degree and is not being concurrently submitted in candidature for any degree.

Signed  Luke Atkinson 21/4/2023

## **STATEMENT 1**

This work is the result of my own investigations, except where otherwise stated. Where correction services have been used, the extent and nature of the correction is clearly marked in a footnote(s).

Other sources are acknowledged by footnotes giving explicit references. A bibliography is appended.

Signed  Luke Atkinson 21/4/2023

## **STATEMENT 2**

I hereby give consent for my work, if accepted, to be available for photocopying and for inter-library loan, and for the title and summary to be made available to outside organisations.

Signed  Luke Atkinson 21/4/2023

## Acknowledgements

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## 1.0 Abstract

This dissertation seeks to explore the relatively uncharted field of gamification applications in a workplace environment for the purpose of improving resilience in employees. This was carried out by sending respondents (N=37) surveys and asking them to rate their impressions of both two different applications and a series of statements around work gamification in general.

This research yielded the interesting result that, while respondents generally believe these applications may stand a chance at improving their resilience in the workplace, many are still reluctant to accept a movement that is not yet widely used — or even heard of — into a place as close to daily life as their place of work.

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## 3.0 Introduction

### 3.1 Topic introduction

This dissertation aims to explore whether the usage of habit tracking tools can reliably improve resilience in the workplace. This is to be done by assessing the likelihood that a functional relationship between the two exists, and the extent to which this is so.

### 3.2 Habits

Good habits, according to Volpp and Loewenstein (2020), are widely accepted to be the central factor for attainment — and retainment — of good health, across a variety of different contexts.

What, then, is a habit? In an article by Gardner (2015), it is a term used to predict and rationalise a behaviour, or series thereof. In addition, habits actively contribute to the generation of these behaviours. This topic will be explored in greater detail in the following section; for now, this explanation will suffice in order to set the scene.

### 3.3 Habit tracking applications

With the knowledge of the nature of a habit, it is important to develop an understanding of the term '*habit tracking application*', (also referred to as a gamification tool) as well as an understanding of the nature and intended usage of this type of tool.

Forbes provides a wealth of information in regards to these tools. Forbes' Racheal Ede (2022) describes habit tracking as attempting either to stop negative habits or incentivise the creation of positive habits by tracking a user's behaviours. A wide variety of activities fall under this umbrella term — Ede mentions that this includes anything as simple as journaling or jotting down key events — although software applications give the user a more thorough experience, featuring multiple functionalities baked into each.

### 3.4 Benefits of these applications

Ede points to a three-step process for generating habits that stick, or breaking negative ones:

1. Identifying and setting particular well-being goals
2. Deciding on a simple daily action towards each goal
3. Aiming for consistency

Habit tracking applications are noted for their ability to guide users through this process by 1) providing motivation and visual cues via positive reinforcement and 2) the physical logging of reminders. During the process, these applications also encourage automaticity of habitual behaviours — doing without thinking, informally — via reinforced repetition of behaviours and insightful self-reflection on habit-forming progress.

### 3.5 Resilience

This aspect of the introduction is perhaps the most important; resilience in the workplace represents the dependent variable within the hypothesis that the study presents. It is thus critical to establish the meaning of this term.

The American Psychological Association (APA, n.d.) refers to resilience as 'the process and outcome of successfully adapting to difficult or challenging life experiences'. One's level of influence is predominantly influenced by three factors: one's engagement with and outlook of the world; the availability of social resources; and one's specific coping strategies.

The HCPC's (n.d.) general guidelines for improving resilience include maintaining focus on what one *can* control, maintaining physical health and establishing realistic goals. Theoretically, a habit tracking application should be able to replicate these growth conditions. This is because such applications encourage the user to focus on their own achievement via self-setting of goals — both for physical health and for creating the right environment for new habits to be formed. Resilience — especially the topic of resilience in a workplace environment — will be covered in greater detail within the next section of this study.

## 4.0 Literature Review

### 4.1 A good literature review

In order to give this study the best start and to set the stage for an impactful literature review, several sources have been gathered and summarised to draw up guidelines for the layout, and any other conventions, that this section should adhere to.

Denney and Tewksbury's expansive article, '*How to Write a Literature Review*' (2013), provides an insight into the art of creating one. A strong literature review is important because it both educates the writer on the topic at hand and improves the credibility and integrity of the author. The best literature reviews include an exhaustive overview of a topic, emphasising the findings of prior studies and the contribution of these findings to the accepted knowledge of a topic.

Denney and Tewksbury list the two most appropriate sources for a literature review as journal articles and academic books. Newspaper or magazine articles should be used sparingly; a heavy reliance on these publications will represent a red flag to the reader of a poorly-constructed review.

### 4.2 Resilience: opening remarks

As mentioned in the introduction section to this dissertation, resilience is referred to as the 'process and outcome of successfully adapting to difficult or challenging life experiences'. This term would suffice for an introduction but, any further than this, a deep exploration into the term is required for an effective study to take place.

A publication by Herrman *et al.* (2011) reviewed the many definitions of resilience as well as the factors generally accepted to contribute to it. The following assertions regarding resilience were uncovered:

- Resilience fundamentally refers to positive adaptation or the ability to gain / maintain mental health despite adversity
- The first definitions uncovered focused on resilience as a personal trait instead of a

process, focusing on it as a personal trait appearing after a short-lived trauma

- Other definitions focused on the use of systems — i.e. families and communities — to assist with coping with adversity
- Each definition acknowledges two points: various factors contribute, as a dynamic process, resulting in increased resilience in response to adversity; and resilience may not necessarily be present across all parts of life, but instead within certain contexts and times.

The same researchers also found and noted several sources of resilience, from personal factors:

- Personality traits were found to contribute to resilience

Biological factors:

- Non-maltreatment in early years was tied to improved resilience

And environmental factors:

- Secure parental attachment and good parenting are associated with reduced behavioural problems
- On a larger scale, support from school and the wider community contribute to improved resilience

Overall, the article concluded that two key concepts could be drawn from the main findings:

- The dynamic nature of resilience across one's lifespan, and
- The interaction of resilience with major facets of life.

This article provides a wealth of information into both the nature and factors contributing towards resilience. It provides a good starting point for a deeper understanding of resilience, but leaves much to be desired if attempting to understand the requirements of a workplace and how aspects of resilience can contribute to better workplace outcomes.

### 4.3 Resilience and the workplace

The findings from several articles have been collated to identify components of resilience and how they interact when faced with a workplace environment.

The first article, by Larry Mallak and Mustafa Yildiz (2016), focuses on the development of an instrument to enhance resilience in the workplace. The study used resilience scales — originally six metrics developed by Mallak (1998) — as the basis for their tool. It was explained that stress is a major cause of heart disease, cancer, accidents and suicide, among other morbidities. Their literature review showed that any pre-existing instruments were not developed in workplace settings, that the aforementioned instruments were differentiated and that there was a need for the development of a workplace resilience instrument. The workplace resilience instrument model resulting from the study comprised four factors:

- Active problem-solving: requires employees to have a bias for action and the ability to focus, instead of worrying;
- Team efficacy: the individual has a comprehensive understanding of how their team operates and achieves its goals;
- Confident sense-making: being able to maintain or extract order out of chaos, as well as filter out unnecessary stimuli when making decisions; and
- Bricolage: a French term — the *bricoleur* uses an engineering approach to fashion solutions creatively, taking intelligent risks in the face of chaotic situations.

A criticism of the instrument is that communication and listening are not directly factored in, however one could argue they are implied to represent a component of team efficacy. Furthermore, the term ‘bricolage’ is vague and may have vastly different implications for different workplaces. The dictionary definition of the term is ‘construction achieved by whatever comes to hand’ (Merriam-Webster, n.d.).

A few shortcomings of the study were that the sample was entirely within the healthcare sector and that the majority were nurses. Overall,

however, the instrument showed the potential to be a useful tool for organisations to improve resilience in their workplaces.

An interesting point was raised during the design of this study. It has been mentioned by several authors (Barnette, 2000; Merritt, 2012; Roszkowski & Soven, 2010) that negatively-worded entries mixed with positively-worded ones are capable of creating their own variances. Following this discovery, only positively-worded entries were used for the study and agree-disagree scales were changed to extent-of-truth.

#### 4.3.1 Occupations and workplaces

The Department for Business, Energy and Industrial Strategy (gov.uk, 2019) reports that there are over 1.4 million employers in the United Kingdom: of this amount, 1.1 million, 81.9%, employ 1-9 staff; 211,000, 15.0%, employ 10-49 staff; 35,000, 2.5%, employ 50-249 staff; and 7,600, 0.5%, employ 250 or more employees. That there are over 1.4 million employers naturally means that there will be great diversity in their nature. Careeronestop (n.d.) reports that the top four occupations in the USA in 2021 were retail salespeople, personal care aides, cashiers and fast food workers, all of which earn a median salary of under \$30,300. The top four occupations earning a median salary of over \$62,710 — the highest earner category on the site — were registered nurses, general and operations managers, accountants and auditors and software developers. The differences in the demands of each job are evident:

- Retail salespeople sell customers on items. Valued traits are stamina to stand for long periods, persuasion, good listening skills and social perceptiveness.
- Personal care aides range from providing care for the disadvantaged to those providing personal advice such as financial advisors.
- Cashiers are responsible for using registers to process transactions. Typically, no formal education is needed. Good oral communication and comprehension are required.

- Fast food workers serve food and beverages by taking and preparing orders. Good oral comprehension is required.
- Registered nurses assess the needs of their patients and provide care accordingly. Active listening, deductive reasoning and ability to notice new problems are valued traits.
- General and operations managers coordinate operations of firms by analysing data to make informed business decisions. Required skills are monitoring personnel and social perceptiveness.
- Accountants and auditors analyse and interpret accounting records, report financial information and provide advice.

Good knowledge of mathematics, accounting practices, reading comprehension and critical thinking are valued traits.

- Software developers are tasked with overseeing the creation of software solutions. Principles from computer science, engineering and mathematics may be applied and teamwork may be required.

A reference chart has been made below to catalogue each job's requirements in relation to Mallak and Yildiz's four-factor workplace resilience instrument.

| Job                    | Active problem-solving? | Team efficacy? | Confident sense-making ? | Bricolage? |
|------------------------|-------------------------|----------------|--------------------------|------------|
| Retail Salespeople     | /                       | ×              | /                        | /          |
| Personal Care Aides    | /                       | ×              | /                        | ×          |
| Cashiers               | /                       | ×              | ×                        | ×          |
| Fast food Workers      | /                       | /              | /                        | ×          |
| Registered Nurses      | /                       | /              | /                        | /          |
| G&O Managers           | /                       | /              | /                        | /          |
| Accountants & Auditors | /                       | /              | /                        | /          |
| Software Developers    | /                       | /              | /                        | /          |

#### 4.3.2 Workplace stressors

The manifestation of job stress will also differ between jobs.

Cara Williams' (2003) article used a 2000 survey of employed Canadians to describe job stress. She drew distinctions between self-employed, full-time and part-time workers, in addition to different demographics. The following are her findings.

The stressor most cited was a lack of time and excessive workload due to home and work responsibilities. The survey mentioned internet and email permanently affixing employees to their workplaces with 34% mentioning this as a source of stress. Sources of stress were also found to

correlate with economic conditions: with conditions in 2000, 40% deemed it to be likely that they would become redundant within a year, leading to 13% reporting worry-related stress.

Self-employed respondents were 6% less likely than the employed to mention poor interpersonal relationships or fear of redundancy, although 3% more reported a greater likelihood of stress due to excessive hours or demands. 26% cited only one source, 16% cited two, and just over 10% cited three or more. Shift workers were found to have a greater likelihood of accidents in the workplace, which were found to be linked to sleepiness due to sleep deficits. 25% of night shift workers reported worry about an accident, compared to only 11% of day-time employees. 42% of those in

healthcare-related employment reported multiple sources of stress; those in trades, transportation and primary occupations were four times as likely than professionals or managers to report a risk of accident.

With regard to age and gender, 22% of younger men regarded risk of accident or injury as a stressor, in comparison to only 15% of older men. Despite there being no concrete explanation, it was attributed to the potential difference in jobs held by younger men or their relative inexperience. Conversely, young people were 12% less likely to cite too many hours or demands, presumably because many their age are new entrants, part time workers or simply lack conflicting demands of work and family. One last point is that, although men and women largely reported the same stressors, they differed in that women aged 45-64 were much more likely than men the same age to stress over too many demands or hours, while men of all ages were more likely to cite fear of an accident.

Lukić and Lazarević (2018) examined the sources of workplace stress in tertiary sector organisations from three different perspectives: job characteristics, organisational context and employee personality traits. A definition of stress by Lazarus & Folkman (2004) was used, which states that stress occurs when one feels an environment is too demanding for their capabilities or needs. Explanation is taken from Stranks (2005) and from Khuong and Yen (2016) that stress is capable of having a positive impact on employees up to either their tolerance level or the level at which they perceive this stress as motivational; this is reflected in the diagram below, labelled *Fig 1.*, adapted from Weinberg, Sutherland and Cooper (2010, p.79).

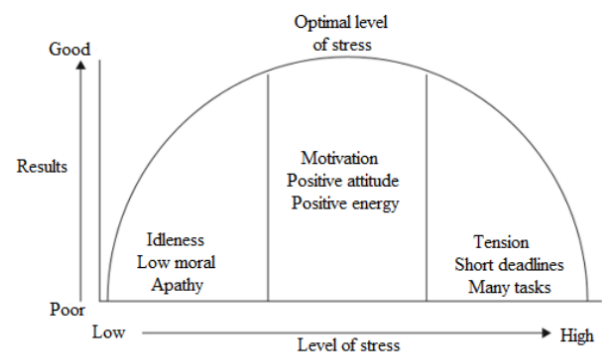


**Fig 1.** The impact of stress level on employees' performance

The first-presenting symptoms of stress are fatigue, frustration and a lack of motivation, beginning when a task surpasses one's level of applicable knowledge, skills and capabilities. Greater stress can bring on symptoms of greater severity, including changes in appetite, headaches and sweating. Prolonged stress at this level could result in psychological or immune disorders, in addition to various diseases of a digestive or cardiovascular nature.

Service-related work — the focus of the paper — is commonly seen as highly stressful: service occupations are commonly low-pay; globalised business brings greater customer expectations; customers are frequently extremely highly valued in these occupations, which puts additional pressure on employees; additionally, workers are expected to quickly adapt to any changes in operations or regulations and to pay regard to any changes in law where relevant.

A brief overview of the key sources of stress in the workplace was taken from Lukić and Lazarević's paper.

**Table 1** The overview of the key sources of workplace stress from different perspectives

| Job characteristics |                                                              |
|---------------------|--------------------------------------------------------------|
| S                   | Job content and nature                                       |
| o                   | Scope of job tasks and activities                            |
| u                   | Employees' autonomy when performing job tasks and activities |
| r                   | Continuous setting up of new goals                           |
| c                   | Too demanding customers                                      |
| e                   | Job insecurity                                               |
| s                   | Working hours                                                |
| Working conditions  |                                                              |
| o                   | Organizational context                                       |
| f                   | Organizational structure and culture                         |
|                     | Mutual relations in an organization                          |
| s                   | Employees' roles in an organization                          |
| t                   | Career development                                           |
| r                   | Leadership style                                             |
| e                   | Employees' personality traits                                |
| s                   | Psychological characteristics of employees                   |
| s                   | Age and work experience                                      |
| Gender structure    |                                                              |

Source: Authors, based on the literature

### 4.3.3 Stress metrics

With knowledge of the workplace resilience instrument by Mallak and Yildiz (2016), the range of potentially stress-inducing demands placed on employees and the commonly-presenting symptoms of stress, all that is needed is a metric by which to define levels of stress. For this purpose, an article by Stanton *et al.* (2001) provides a trove of information. Three studies were carried to create a definitive general-use workplace stress metric.

There exist three opportunities for the perception of stress to be recognised and processed: primary appraisal, secondary appraisal and reappraisal. Primary appraisal involves recognising a stressor as causing stress, secondary appraisal is the selection of an appropriate response and reappraisal is the re-assessment of the stressfulness of the situation.

Assessment of stress is divided into three approaches: the measurement of stressors, the measurement of stress symptoms, and using reports of the experience of stress.

The third approach is used as the basis of the instrument of the study. It is respondent-led, involving self-reports of the experience of stress. The respondent will be consciously aware of the experience of stress during primary appraisal and reappraisal stages of self-assessment and can report these experiences as stressful.

The article outlined three goals for directing the measurement performed by the stress instrument:

1. The development of a measure of stress distinguishable from that of dissatisfaction;
2. It should be a general measure of job stress; and
3. It should be widely applicable across many situations and among various respondents

With these goals in mind, three studies were conducted. For the first study, eighteen items were selected from a pool of evaluative terms and employees of a large company were given a research survey. The adjectives on which respondents were polled are shown below. From this study, *SIG-I*, the first factor, was labelled the *Pressure* timescale; *SIG-II* was labelled the *Threat* subscale.

Table 1  
Study 1: Characteristics of Retained Items

| SIG-I (alpha = .88)   |          |           |                  | SIG-II (alpha = .82)         |          |           |     |
|-----------------------|----------|-----------|------------------|------------------------------|----------|-----------|-----|
| Item                  | <i>M</i> | <i>SD</i> | ITC <sup>a</sup> | Item                         | <i>M</i> | <i>SD</i> | ITC |
| Demanding             | 2.13     | 1.3       | .61              | Irritating                   | 1.19     | 1.4       | .55 |
| Pressured             | 1.87     | 1.4       | .74              | Under control (R)            | 0.88     | 1.2       | .51 |
| Hectic                | 2.07     | 1.3       | .68              | Nerve-wracking               | 1.19     | 1.4       | .63 |
| Calm (R)              | 2.25     | 1.2       | .63              | Hassled                      | 1.25     | 1.4       | .61 |
| Relaxed (R)           | 2.15     | 1.3       | .64              | Comfortable (R)              | 1.14     | 1.3       | .49 |
| Many things stressful | 1.83     | 1.4       | .68              | More stressful than I'd like | 1.23     | 1.4       | .60 |
| Pushed                | 1.58     | 1.4       | .66              | Smooth running (R)           | 1.81     | 1.3       | .50 |
|                       |          |           |                  | Overwhelming                 | 0.56     | 1.1       | .37 |

Note. SIG = Stress in General scale. Each item was scored as "no" = 0, "?" = 1.5, "yes" = 3. (R) signifies a reverse-coded item.

a. Corrected item-total correlation.

The second study involved giving the same list of eighteen adjectives to participants in a larger survey under a new set of instructions to either answer *Yes*, *No*, or *?*.

The third study required participants to complete a self-report instrument involving the SIG subscales; they were then required to complete a mental arithmetic test shown to induce mild stress with blood-pressure readings taken at different intervals. The pressure subscale was found to have a positive correlation with blood-pressure reactivity; the threat subscale shared this correlation albeit to a lesser degree.

Concluding the study, the SIG subscales proved to be a sound measure of general workplace stress. The SIG test boasts broader overall coverage and greater brevity than other measures of stress, in addition to being quicker to complete. The work of refining a scale is never complete; this point is echoed by Stanton *et al.*

## 4.4 Gamification basics

Gamification was briefly mentioned in the introduction to this dissertation; this section aims to expand upon it with an exploration into the process of gamification.

The first article, by Kapp (2012), sought to dispel myths about gamification. Due to publicity around the tool, four popular myths have developed, covered below.

The first myth is that gamification and games are the same. Gamification does use a few game elements — earning points, overcoming challenges and accomplishing tasks — but the two are otherwise distinguished.

The second myth is that gamification alienates older learners; this is based on stereotypes. Although there is no one-size-fits-all solution, it is better to look at the type of content to be learned and how often to reinforce it instead of age.

The third myth is that there is no science behind gamification, when in fact it is based on two learning practices: retrieval practice and spaced retrieval. The former involves recalling information to test the learner; the latter involves content spaced over time.

The fourth myth is that gamification is simply about points, badges and leaderboards. The most effective gamification strategies contain elements of story, challenge and interactivity.

Deterding's article (2012) mentions how gamification is rooted in the 'serious games' movement of the early 2000s with games created for the purposes of training, educating and persuading. Gamification is the new buzzword for using elements of game design in non-game contexts. While implementation is booming, the concept is controversial among game designers, many of which argue it is a soulless amalgamation of features from games, simply attempting to extract value from users.

Çeker and Özdamlı (2017) also sought to make clarifications about gamification. They defined gamification as requiring the mixing together of many teaching and learning principles for the

accomplishment of complicated tasks, extended to encompass the usage of gamified thinking and game mechanics for the solution of problems. Where the main aim of games is to entertain, Çeker and Özdamlı argued that gamification helps change attitudes and behaviours.

A distinction was also drawn between gamification and game-based learning; games cannot replace the learning process with gamification, whereas learners arrive at targets while playing games with game-based learning. The correct usage of gamification brings many benefits; primarily aiding focus on tasks; increasing participation, motivation and satisfaction; and relieving the boredom of regular work. Examples of successfully applied gamification are Kahoot!, Duolingo and ClassDOJO. Concluding the article, there is a positive effect from the correct application of gamification.

An article by Suh *et al.* (2017) develops on the concept of gamification in the workplace. Studies into gamification have highlighted a difficulty in sustaining user engagement due to the short-lived nature of its reward system; it was found that many users discontinue engagement within a few months.

Research pointed at two views for solving this issue, named *deep engagement* and *meaningful engagement*. The former argues that gamified information systems should be designed for total user immersion, heightening users' focus. The latter argues that gamification should provide users with the means to explore and reflect on the information found through gamification, helping them to experience a sense of meaning.

Concluding this section, the works of various authors were used to expand upon the concept of gamification. Noteworthy points include Kapp's (2012) article dispelling myths; Deterding's (2012) finding that gamification is controversial among game designers; the important distinction drawn by Çeker and Özdamlı (2017) between gamification and game-based learning; and the development on the topic of gamification in the workplace by Suh *et al.*

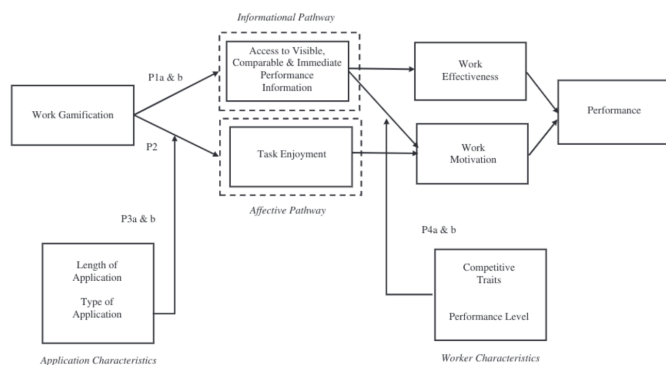
#### 4.4.1 Work gamification and habit tracking

Habit tracking — specifically a habit tracking *application* — is a form of gamification developed for self-administration and use.

The article *The theory of work gamification* (Cardador *et al.*, 2017) discusses the theory underpinning it.

Work gamification is itself an approach to performance management, in which technology is harnessed to permit real-time access to performance information. Points, badges and leaderboard statistics are visible both to the user themselves and to others for easy comparing and contrasting. Social comparison theory details that information about others' performance can motivate workers to improve their performance. In contrast with typical work goals, which are often too distant for a regular sense of achievement, goals created through gamification can provide almost continuous feedback.

All of the propositions mentioned in the article have been adapted into a chart, shown below.



Theory of work gamification (Cardador *et al.*, 2017)

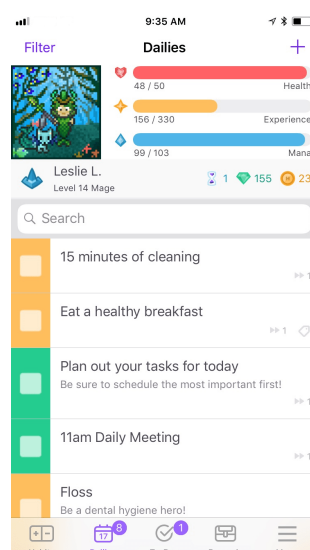
A good case study into habit gamification is the app *Habitica*, summarised by Gerdenitsch *et al.* (2020) in the following paragraph.



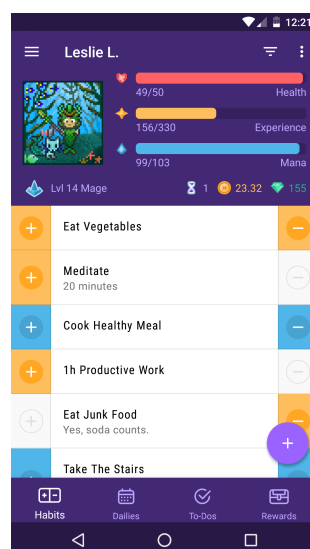
Habitica logo (Habitica, n.d.)

Habitica is an online role playing game with 250,000 active users aiming to motivate its users to reach

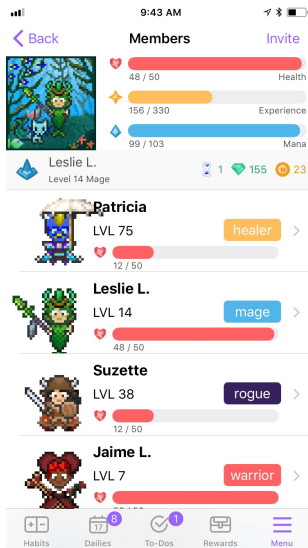
self-set goals. The app can be downloaded for free and used for any kind of task. Users play as a fantasy character and real life tasks can be transferred onto the application. Functionalities include completing tasks, getting points, reaching a higher level and being rewarded with items for customisation. Features include habits, 'dailies', to-dos and rewards; habits are designed for creating and maintaining habits, dailies are repeatable tasks doable at regular intervals, to-dos are designed for goal-setting, and rewards are meant to support motivation of users. The app uses a carrot and stick approach to gamification: completing goals and checking off tasks yields rewards, while failing leads to losing health and potentially 'dying'. The following images are from habitica's press kit.



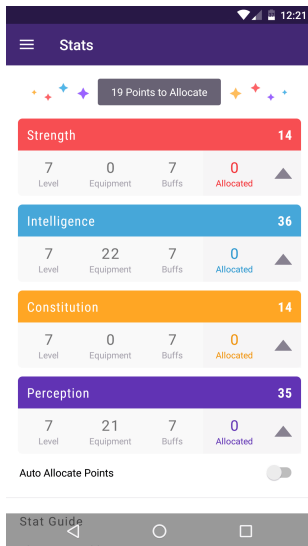
'Dailies' screen on mobile (Habitica, n.d.)



Habits screen on mobile (Habitica, n.d.)



Party screen on mobile (Habitica, n.d.)

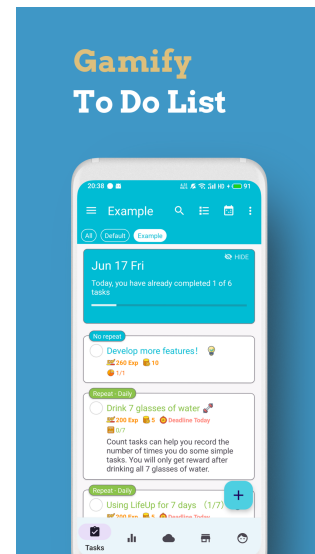


Stats screen on mobile (Habitica, n.d.)

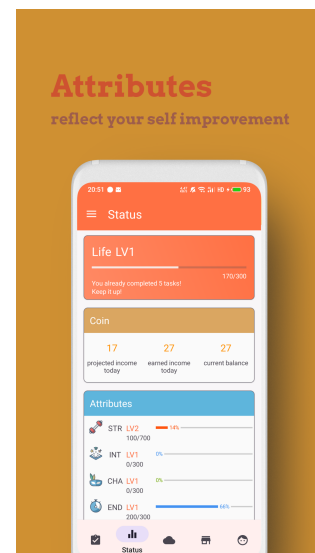
Habitica appears to be the largest app in this genre, indicated by the functionalities it boasts, its active user count and the elaborateness of its public relations. Another app in the same genre is LifeUp, described below.

A GitHub download page for the app (Ayagikei, n.d.) explains that it provides a to-do and habit system in a similar way as Habitica. The app allows for the recording of tasks for experience and coins; experience develops the user's attributes and skill levels. Coins can be used for rewards and achievements can be set up to automatically track progress. The app boasts the following features: attributes and skills, a rewards shop, achievements, pomodoros, loot boxes and an open-ended crafting system, all for a one-time payment. This app contrasts with Habitica's focus on pixel art and

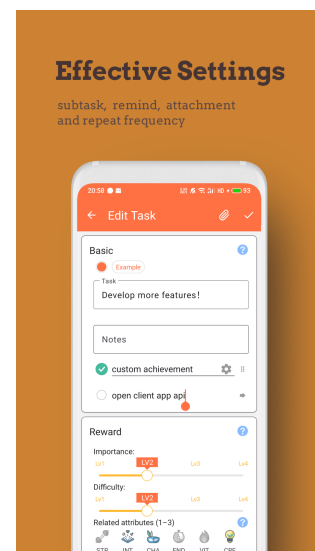
character design, instead opting for a more streamlined approach.



Main promotional image (Ayagikei, n.d.)



Attributes promotional image (Ayagikei, n.d.)



Settings promotional image (Ayagikei, n.d.)

#### 4.5 Concluding literature review

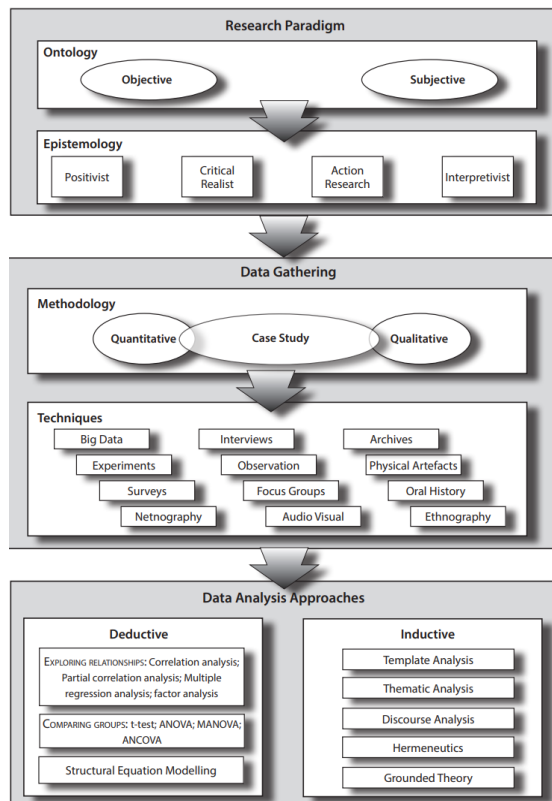
Concluding this literature review, a wide variety of literature from many authors has been covered to broadly examine what is meant by resilience, how this may differ across workplaces and how it can be transformed into a measurable instrument. With this knowledge, research was conducted into gamification

apps with the aim of finding out what they are, how they operate and whether there is documentation of them working in a workplace setting.

A noteworthy point is that no literature was found to directly mention the application of habit tracking applications in a workplace. This must therefore be an uncharted field, which could lead to interesting results with the findings from this research.

## 5.0 Methodology

For this section of the dissertation, the image below will be referred to. All terminology used in the image will be explained where necessary.



From O’Gorman and MacIntosh’s *Research Methods* (2015, p.51)

### 5.1 Explanation of terms

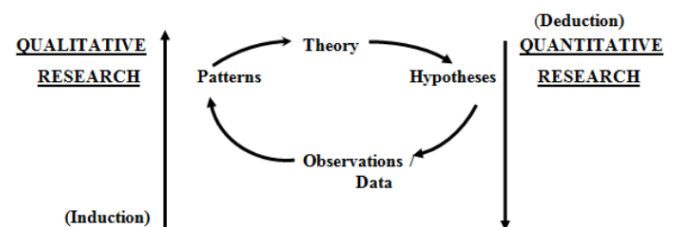
Beginning the methodology, an objective ontology and a positivist epistemology were chosen for the research paradigm.

A good starting point for everything listed above is Dr. Khaldi’s (2017) research article explaining types of paradigms. It explained that a clear understanding of the philosophical foundations of research helps students opt for the best possible choice of paradigm.

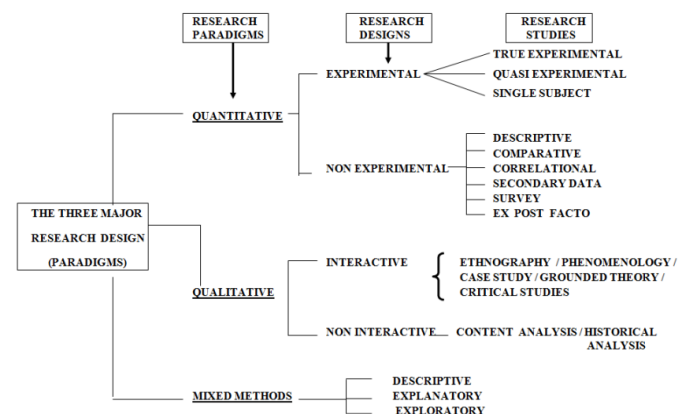
A paradigm is defined as a comprehensive belief system, world view or framework guiding research in a field. The term *methodology* is used to encapsulate the design, data collection

procedures, methods of data analysis and subject selection for any one study.

The first major scientific paradigm to be regarded as existing comprises two opposing views, collectively named the ‘inductive/deductive distinction’. Inductive reasoning begins with specific observations and moves towards a general conclusion or theory; deductive reasoning finds its starting point at a general statement, followed by an inferred statement to reach a specific conclusion. The inductive approach to methodology involves observation, contextual pattern identification and the drawing of generalisations using said patterns. Conversely, the deductive approach entails the posing of a hypothesis based on literature, the gathering of relevant data to test it and an ultimate decision as to whether it is rejected or accepted. The distinction between the two and the process itself are illustrated in the images below.



The distinction illustrated (Khaldi, 2017)



The process mapped out (Khaldi, 2017)

Following on from paradigms, ontology and epistemology are next to be outlined.

According to Smith (2012), ontology is a philosophical branch defined as the science of what is, the nature of objects, properties, processes and relations in all areas of reality. By seeking to provide a definitive classification of entities in existence, the field differs from other sciences. Guarino *et al.* (2009) noted that ontology has usage as both an uncountable noun and a countable noun; the former is a philosophical discipline and the latter is a kind of information object.

It is explained by Houghum (2012, p26) that objective ontology is, at heart, defined by the idea of reductionism, which is to say that an object of study can be examined through separation into constituent parts; the end goal of reductionism is to achieve a greater understanding of the object by examining its constituent parts.

Objectivism is defined by Forrest (2018) as a metaphysical position arguing for the complete mind-independence of the world; the real world is the singular totality of nature and nature exists independent of cognition.

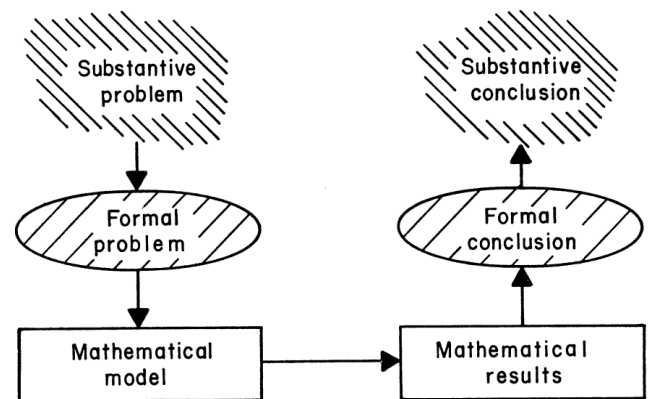
The book *Epistemology* by Everson (1990) delves into the root word of epistemology. Originally and traditionally defined as ‘knowledge’, the term has since been revised to be tentatively defined as ‘true belief with an account’. Epistemology is expanded upon by Fumerton (2009) in his book of the same name. In seeking to define epistemology, he made clear distinctions between types of ‘knowing’; that which is most useful to the epistemologist is propositional knowledge, or that which dictates that things are a certain something.

An article by Park *et al.* (2020) aimed to explore the paradigm of positivism; it concisely summarised the term as being aligned with the hypothetico-deductive model of science, depicting the verification of a hypothesis via experimentation.

Under the *data gathering* section of the reference image, a quantitative methodology was chosen, followed by the use of surveys as the primary technique. Under *data analysis approaches*,

correlation analysis was chosen as the deductive approach of choice.

Strauch (1976) goes into detail on the topic. The article was written with the aim of examining the suitability of quantitative methods for ‘squishy’ problems — those with non-mathematical nuance. The image below was taken from the article as a representative illustration for the process.



Quantitative methodology (Strauch, 1976)

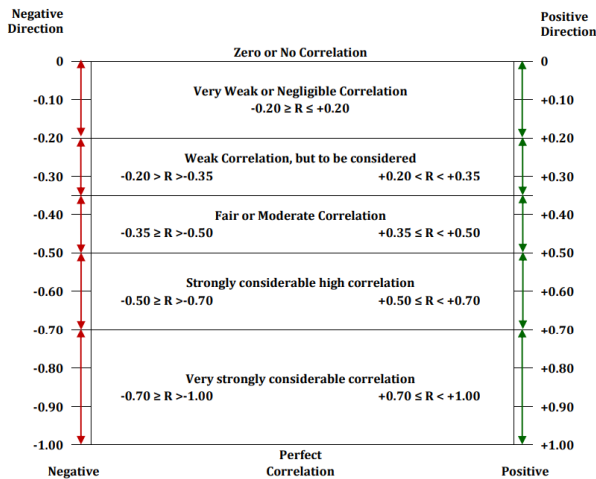
Regression analysis was provided as an example of a quantitative methodology, based on two time series. It involves a regression line being fitted to data in order to predict a value — for example, Y, given X.

Strauch then examined the idea of ‘quantificationism’ — a school of thought which holds that, for most questions, a quantitative answer is, through deduction, better than a qualitative answer. The most important aspects of the idea are a focus on models, techniques and results and a belief that this emphasis is appropriate in the application of quantitative methodology for ‘squishy problems’.

Correlation analysis is a large field with correlation at its heart, summarised by Lindley (1990) as ‘a tool for understanding the relationship between two quantities’. Lindley writes that two quantities are considered symmetrically for correlation analysis, while in the aforementioned regression analysis, one is dependent on another asymmetrically.

Senthilnathan’s (2019) *Usefulness of Correlation Analysis* goes into greater detail on the topic of

linear correlation analysis, defining it as a tool for representing the closeness of one variable in relation to another. The purpose of this tool is to explore the degree to which a relationship exists between two variables, represented in the image below.



These terms all link together to form the basis of the framework made use of by this research.

## 5.2 Research process

With an understanding of the academic terms used, these terms will be applied in an explanation of how the research was carried out.

Prefacing this section, a noteworthy point to mention is that the prior literature review played an integral part in the shaping of the methodology of the research in this dissertation. Owing to its enormity and vastness of scope, many insights into workplace stress and resilience were unlocked before consideration of *what*, fully, the research project would entail. This led to the possibility for greater focus of the research efforts undertaken using the knowledge gained from these aforementioned insights.

1)

To begin the deductive process illustrated beforehand, established theory was used as the basis of this research.

2)

The second stage of the cycle is the hypothesis. Based on the theory of gamification apps improving resilience via positive habits, a 'master' ( $H_M$ ) and null ( $H_0$ ) hypothesis were created based on a research question (R), followed by a series of secondary hypotheses together contributing to the crux of the master ( $H_1$ ,  $H_2$ ,  $H_3$  and  $H_4$ ).

**R:** Are gamification apps capable of universally increasing resilience in the workplace?

**$H_M$ :** Gamification apps are capable of improving all employees' resilience in the workplace to an extent.

**$H_0$ :** Gamification apps have no capability for an effect on resilience in the workplace, regardless of usage.

**$H_1$ :** Age plays a significant part in the receptiveness of employees to gamification apps.

**$H_2$ :** Those who have been in the same job for longer periods may not receive the same effect from gamification apps as others.

**$H_3$ :** Employment in tertiary and quaternary sectors is easier to gamify than in primary and secondary sectors.

**$H_4$ :** Those with greater job stress may be more receptive to gamification for its stress-abating potential.

**$H_5$ :** There exists no gender difference in receptiveness to gamification apps.

**$H_6$ :** People take gamification seriously instead of seeing it as a trend or fad.

With these hypotheses in place, the research to answer them could be planned and structured.

3)

The next phase of this research was to organise and execute the collection of data, representing the largest part of this methodology.

Surveys were the method of choice for testing these hypotheses — specifically a cross-sectional online survey, described by Connelly (2016) as occurring only at one point in time, for the sake of simplicity. Questions were devised to best capture the opinions of respondents in light of the existing hypotheses. Snowball sampling was chosen as the sampling method of choice; described by Goodman (1961) as involving a predetermined amount of stages of respondent base expansion from a random sample.

Microsoft Forms was the tool of choice for administration of surveys due to the ease of transporting data to other elements of the Microsoft Office Package.

The survey was shared with a limited number of individuals who were asked to propagate it via their own communication channels. The resulting respondent count was 37, at which point the survey was closed and the data was transferred to an Excel file to tidy data. With this, the data was transferred to the IBM Statistical Package for Social Sciences (SPSS) wherein it was processed and analysed to find the results to the hypotheses posed previously.

4)

The last phase of this research is the finding of patterns from collected data. This was carried out via cross-tabulation and creation of graphs in SPSS to demonstrate and emphasise patterns.

The process involved in and results from this phase will largely be covered in the results section of this dissertation.

### 5.3 Ethical groundwork

Ethics is both very vast and very important with regard to research. For this section, the ethical works of three different articles have been collated for a multitude of perspectives on the issue.

Dooly *et al.* (2017) adapted the 11-step GREIP research ethics protocol into their article (the 11th step has been omitted) as follows:

- 1) Before undertaking research, always consider whether the study has the potential to cause harm to any party. This must be minimised.
- 2) Always provide sufficient information to necessary parties; fully inform participants of the approach and purpose of the research in addition to data collection procedures. Leave contact details for all participants.
- 3) Obtain informed consent from all parties involved prior to the research and ensure that a compliance document has been signed by all relevant parties.
- 4) Always include the option of opting out in consent requests.
- 5) Ensure the confidentiality of all subjects, including data considered sensitive from reviews of documents.
- 6) Only gather data to further the study. Do not gather any additional personal data which is not immediately pertinent to the study.
- 7) Participant schools may request to view the data before data management begins; if they find it objectionable for a justifiable reason, the data must be destroyed.
- 8) Access to raw data is only granted to members of the immediate research team, or to collaborating researchers with full accreditation following explicit permission being granted.
- 9) Fully disclose any methods of data processing to informants, anonymising data to avoid the potential for recognition.
- 10) Only use processed data for academic or educational purposes if it is included in a written consent form signed by informants.

Kjellström *et al.* (2010) identified ethical topics typically addressed in nurses' doctoral dissertations to investigate whether the formalisation of research ethics actually helps researchers with implementation. 64 dissertations were analysed and these were found to contain between one and seven research ethics topics:

- Approval of an ethics board (94%)
- Obtaining informed consent (86%)
- Confidentiality (67%)
- Ethical aspects of methods (61%)
- Use of ethical principles and regulations (39%)
- Rationale for the study (20%)
- Fair participant selection (14%)

The most frequent result was a dissertation reporting four ethics issues, with 72% of dissertations including between three and five. Overall, the study demonstrated that the mention of research ethics in dissertations is too little.

Fujii's (2012) *Research Ethics 101: Dilemmas and Responsibilities* argued that ethics should matter to everyone and that ethics is an ongoing task.

Guidelines used by American universities are the Belmont Report of 1979 and the IRB Guidebook of 1993, together forming three guiding principles for ethical research:

- Respect for people, treating them as the ends, not the means;
- Beneficence, which is one's duty to maximise benefits and minimise harm; and
- Justice, which is to say that selecting participants should not be done in a manner slanted toward any group out of convenience or prejudice.

Fujii identified three sources of dilemmas: those of a power imbalance between the researcher and researched, of social proximity to participants leading to privacy and confidentiality issues, and publication for the protection of privacy and confidentiality post-research. In addition, it was mentioned that consent is capable of being a very ambiguous notion; 'yes' can be a vague term with implicit meanings. Researchers would do well to ask why people might consent, such as if a consentee believes that they may stand to benefit from a relationship between the two parties.

### 5.3.1 Ethics in practice

With the groundwork in place for an effective ethics review, a concise explanation and discussion of ethical undertakings and considerations involved with this research can begin.

The seven ethics topics addressed by Kjellström *et al.* will be addressed in this section.

#### 1) Approval of an ethics board

The research involved in this dissertation has been approved by the project supervisor; an ethics form has been signed by both parties detailing the processes involved and steps taken to minimise any risks present.

#### 2) Informed consent

Informed consent was taken into account when creating surveys by including a clause as the first text that any respondents would read, stating that continuing would signal one's agreement with the following:

- They are participating in a research study
- They understand both this research and the extent of their participation
- All participation is voluntary and they are free to withdraw at any time
- All data remains anonymous
- For any questions, they may email the lead researcher.

A small debrief followed the survey, thanking respondents for their time and asking them to propagate the survey to reach a greater audience if possible.

#### 3) Confidentiality

Asking for names, locations or other data of a revealing nature was avoided in the survey to prevent any potential breaches of confidentiality.

One potential issue to flag up, however, is that the survey asked for people's rough job titles worded as the 'nature of their employment' — an example being the financial services industry — which, combined with respondent's age bracket and gender, could potentially be used to identify respondents.

Another layer of protection to respondents' confidentiality is that this data is private and only accessed by the lead researcher, who is ethically bound not to pry beyond the context of the study.

#### 4 & 5) Ethical aspects of methods, use of ethical principles and regulations

The aforementioned 11-step GREIP research ethics protocol was considered and implemented into the research project before any surveys could

be administered, ensuring that sufficient information was provided to all parties and that confidentiality and autonomy of respondents were paramount throughout.

Documentation on the topic of ethics was strictly followed throughout the research process in accordance with UWTSD ethics guidelines (n.d.) to create a transparent research process ensuring the protection of all parties involved and to uphold the reputation of the university.

#### 6) Rationale for the study

Gamification applications such as Habitica, although reported on by the works of a few scholars, have not at all been considered for use in a work environment; this presents a fascinating opportunity to explore the potential for the utilisation of these applications in such environments for the improvement of resilience.

The context of improving resilience was chosen as a metric of improvement in the workplace in order to have an idea with which to demonstrate the potential for positive repercussions in a workplace environment.

Another factor leading to resilience being chosen was its relative ethical safety compared to topics such as managing emotions or relationships in a workplace; the latter two may be of a more

sensitive nature, which would have the potential to cause issues either during data collection or post-publishing.

#### 7) Fair participant selection

Fair selection of participants is another factor of great importance, underpinned by its place as the third guiding principle of the 1979 Belmont Report and 1993 IRB Guidebook (Fujii, 2012).

Ideally, selection of participants should be undertaken in a manner which avoids the slanting towards any group, either out of convenience or prejudice.

Ethically, this area is admittedly the least sound of all; due to the snowball sampling method used from a base group of convenient individuals, there may be an unavoidable slanting towards local groups or individuals in addition to races and genders. An attempt was made to minimise the risk of this ethical dilemma manifesting by appealing to a diverse array of individuals as the primary base for the 'snowball' effect. However, unavoidable circumstances have led to the respondent base being a female-majority in addition to being primarily comprising individuals aged 18-34 by a large margin. Despite these setbacks, the rest of the results from the surveys are free of bias or slanting.

## 6.0 Findings

### 6.1 Guide

The reference chart below shows which survey questions directly pertain to any of the six sub-hypotheses.

| HYPOTHESIS     | Q  | PARADIGM       |
|----------------|----|----------------|
| H <sub>1</sub> | 1  | QUAL.          |
| H <sub>5</sub> | 2  | QUAL.          |
| H <sub>2</sub> | 3  | QUAL.          |
|                | 4  | QUAL.          |
| H <sub>3</sub> | 5  | QUAL.          |
|                | 6  | QUAL.          |
|                | 7  | QUAL.          |
|                | 8  | QUAL.          |
| H <sub>4</sub> | 9  | QUAL.          |
|                | 10 | QUAL.          |
|                | 11 | QUAL.          |
|                | 12 | QUAL.          |
|                | 13 | QUAL.          |
|                | 14 | QUAL.          |
|                | 15 | QUAL.          |
|                | 16 | QUAL.          |
|                | 17 | QUAL.          |
|                | 18 | QUAL.          |
|                | 19 | QUAL. / QUANT. |
| H <sub>6</sub> | 20 | QUAL.          |
|                | 21 | QUAL.          |
|                | 22 | QUAL.          |

### 6.2 Findings mapped

This section maps out the findings from the surveys (N=37) in a basic format.

#### Question 1: Age of respondent

| Age   |    |       |
|-------|----|-------|
|       | N  | %     |
| 18-24 | 14 | 37.8% |
| 25-34 | 11 | 29.7% |
| 35-44 | 1  | 2.7%  |
| 45-54 | 8  | 21.6% |
| 55-64 | 3  | 8.1%  |

#### Question 2: Gender of respondent

| Gender |    |       |
|--------|----|-------|
|        | N  | %     |
| M      | 12 | 32.4% |
| F      | 25 | 67.6% |

#### Question 3: Whether in employment currently or previously

| Employment |    |       |
|------------|----|-------|
|            | N  | %     |
| Yes        | 34 | 91.9% |
| No         | 3  | 8.1%  |

Note: 3 respondents answered 'No' and thus exited the survey early as the questions would not be relevant to their situation.

#### Question 4: Length of respondent employment

| Length of employment |   |       |
|----------------------|---|-------|
|                      | N | %     |
| <6mo                 | 2 | 5.4%  |
| 6-12mo               | 8 | 21.6% |
| 1-2y                 | 8 | 21.6% |
| 3-5y                 | 7 | 18.9% |
| 6-10y                | 8 | 21.6% |
| >21y                 | 1 | 2.7%  |

#### Question 5: Sector of respondent employment

| Sector     |    |       |
|------------|----|-------|
|            | N  | %     |
| Primary    | 4  | 10.8% |
| Secondary  | 8  | 21.6% |
| Tertiary   | 17 | 45.9% |
| Quaternary | 5  | 13.5% |

#### Question 6: Nature of respondent employment

| Job Title                 |   |       |
|---------------------------|---|-------|
|                           | N | %     |
|                           | 3 | 8.1%  |
| Manufacturing             | 5 | 13.5% |
| Agriculture               | 3 | 8.1%  |
| Business consultancy      | 1 | 2.7%  |
| Communication             | 1 | 2.7%  |
| Construction              | 1 | 2.7%  |
| Ecology                   | 1 | 2.7%  |
| Education                 | 1 | 2.7%  |
| Environmental Consultancy | 1 | 2.7%  |
| Fast Food                 | 1 | 2.7%  |
| Financial services        | 2 | 5.4%  |
| Healthcare                | 1 | 2.7%  |
| Hospitality and leisure   | 4 | 10.8% |
| Public sector             | 4 | 10.8% |
| Retail                    | 5 | 13.5% |
| Transport                 | 1 | 2.7%  |
| Veterinary                | 2 | 5.4%  |

## Question 7: Skills required for respondent employment

### Active problem-solving

|       | N  | %     |
|-------|----|-------|
| Yes   | 29 | 85.3% |
| Maybe | 3  | 8.8%  |
| No    | 2  | 5.9%  |

### Team Efficacy

|       | N  | %     |
|-------|----|-------|
| Yes   | 27 | 79.4% |
| Maybe | 5  | 14.7% |
| No    | 2  | 5.9%  |

### Sense-making

|       | N  | %     |
|-------|----|-------|
| Yes   | 31 | 91.2% |
| Maybe | 2  | 5.9%  |
| No    | 1  | 2.9%  |

### Bricolage

|       | N  | %     |
|-------|----|-------|
| Yes   | 22 | 64.7% |
| Maybe | 4  | 11.8% |
| No    | 8  | 23.5% |

Note: the terms above are hereby listed in abbreviated forms: APS, TE, SM and B respectively.

## Question 8: Extent of respondent skill possession

### APS Proficiency

|           | N  | %     |
|-----------|----|-------|
| Perfec... | 5  | 14.7% |
| Good      | 28 | 82.4% |
| OK        | 1  | 2.9%  |

### TE Proficiency

|           | N  | %     |
|-----------|----|-------|
| Perfec... | 5  | 14.7% |
| Good      | 23 | 67.6% |
| OK        | 5  | 14.7% |
| ?         | 1  | 2.9%  |

### SM Proficiency

|           | N  | %     |
|-----------|----|-------|
| Perfec... | 7  | 20.6% |
| Good      | 19 | 55.9% |
| OK        | 7  | 20.6% |
| ?         | 1  | 2.9%  |

### B Proficiency

|           | N  | %     |
|-----------|----|-------|
| Perfec... | 4  | 11.8% |
| Good      | 14 | 41.2% |
| OK        | 9  | 26.5% |
| Bad       | 2  | 5.9%  |
| ?         | 5  | 14.7% |

## Question 9: Job Stress Test SIG 1

Codes are as follows; 1 = Yes; 2 = ?; 3 = No

|                       | Count |    |
|-----------------------|-------|----|
| Demanding             | 1     | 28 |
|                       | 2     | 1  |
|                       | 3     | 5  |
| Pressured             | 1     | 23 |
|                       | 2     | 5  |
|                       | 3     | 6  |
| Hectic                | 1     | 26 |
|                       | 2     | 2  |
|                       | 3     | 6  |
| Calm                  | 1     | 10 |
|                       | 2     | 6  |
|                       | 3     | 18 |
| Relaxed               | 1     | 10 |
|                       | 2     | 6  |
|                       | 3     | 18 |
| Many things stressful | 1     | 22 |
|                       | 2     | 5  |
|                       | 3     | 7  |
| Pushed                | 1     | 19 |
|                       | 2     | 8  |
|                       | 3     | 7  |

## Question 10: Job Stress Test SIG 2

Codes are as follows; 1 = Yes; 2 = ?; 3 = No

|                              | Count |    |
|------------------------------|-------|----|
| Irritating                   | 1     | 14 |
|                              | 2     | 5  |
|                              | 3     | 15 |
| Under Control                | 1     | 19 |
|                              | 2     | 7  |
|                              | 3     | 8  |
| Nerve-wracking               | 1     | 9  |
|                              | 2     | 6  |
|                              | 3     | 19 |
| Hassled                      | 1     | 13 |
|                              | 2     | 5  |
|                              | 3     | 16 |
| Comfortable                  | 1     | 19 |
|                              | 2     | 11 |
|                              | 3     | 4  |
| More stressful than I'd like | 1     | 18 |
|                              | 2     | 5  |
|                              | 3     | 11 |
| Smooth running               | 1     | 10 |
|                              | 2     | 13 |
|                              | 3     | 11 |
| Over-whelming                | 1     | 9  |
|                              | 2     | 9  |
|                              | 3     | 16 |

## Question 11: Rating of impression of Habitica

### Habitica Impression

|    | N | %     |
|----|---|-------|
| 0  | 3 | 8.8%  |
| 2  | 2 | 5.9%  |
| 3  | 3 | 8.8%  |
| 4  | 1 | 2.9%  |
| 5  | 6 | 17.6% |
| 6  | 6 | 17.6% |
| 7  | 7 | 20.6% |
| 8  | 2 | 5.9%  |
| 9  | 2 | 5.9%  |
| 10 | 2 | 5.9%  |

## Question 12: Whether respondent envisions forming a group with colleagues

### Grouping

|            | N  | %     |
|------------|----|-------|
| Definit... | 3  | 8.8%  |
| Likely     | 6  | 17.6% |
| Maybe      | 9  | 26.5% |
| Unlike...  | 11 | 32.4% |
| Never      | 5  | 14.7% |

Question 13: Whether respondent anticipates enjoyment of a fantasy skill system with XP

| Fantasy Skills |    |       |
|----------------|----|-------|
|                | N  | %     |
| Definit...     | 6  | 17.6% |
| Likely         | 11 | 32.4% |
| Maybe          | 7  | 20.6% |
| Unlike...      | 6  | 17.6% |
| Never          | 4  | 11.8% |

Question 14: Rating of impression of LifeUp

| LifeUp Impression |    |       |
|-------------------|----|-------|
|                   | N  | %     |
| 0                 | 2  | 5.9%  |
| 3                 | 2  | 5.9%  |
| 4                 | 3  | 8.8%  |
| 5                 | 10 | 29.4% |
| 6                 | 5  | 14.7% |
| 7                 | 4  | 11.8% |
| 8                 | 2  | 5.9%  |
| 9                 | 2  | 5.9%  |
| 10                | 4  | 11.8% |

Question 15: Whether respondent would enjoy dictating their own goal progression as with LifeUp

| Goal Progression |    |       |
|------------------|----|-------|
|                  | N  | %     |
| Definit...       | 4  | 11.8% |
| Likely           | 9  | 26.5% |
| Maybe            | 13 | 38.2% |
| Unlike...        | 6  | 17.6% |
| Never            | 2  | 5.9%  |

Question 16: Whether respondent envisions enjoying skill progression pertaining to their own attributes as with LifeUp

| Own Attributes |    |       |
|----------------|----|-------|
|                | N  | %     |
| Definit...     | 5  | 14.7% |
| Likely         | 11 | 32.4% |
| Maybe          | 10 | 29.4% |
| Unlike...      | 6  | 17.6% |
| Never          | 2  | 5.9%  |

Question 17: Whether respondent agrees with the following statements

Codes are as follows;

1 = Extremely true; 2 = Very true; 3 = Fairly true; 4 = Not very true; 5 = Not true

|                                                                                    | Count |    |
|------------------------------------------------------------------------------------|-------|----|
| Like idea of playing as fantasy character                                          | 1     | 8  |
|                                                                                    | 2     | 4  |
|                                                                                    | 3     | 13 |
|                                                                                    | 4     | 8  |
|                                                                                    | 5     | 1  |
| See how trying to improve a character's skills would help me achieve work goals    | 1     | 10 |
|                                                                                    | 2     | 7  |
|                                                                                    | 3     | 9  |
|                                                                                    | 4     | 7  |
|                                                                                    | 5     | 1  |
| Like idea of group accountability as opposed to going it alone                     | 1     | 7  |
|                                                                                    | 2     | 11 |
|                                                                                    | 3     | 11 |
|                                                                                    | 4     | 4  |
|                                                                                    | 5     | 1  |
| More important to focus on own skills than to invest time into a fantasy character | 1     | 8  |
|                                                                                    | 2     | 19 |
|                                                                                    | 3     | 3  |
|                                                                                    | 4     | 4  |
|                                                                                    | 5     | 1  |
| Prefer colour coding to understand performance and where weaknesses lie            | 1     | 10 |
|                                                                                    | 2     | 14 |
|                                                                                    | 3     | 5  |
|                                                                                    | 4     | 5  |
|                                                                                    | 5     | 1  |
| Prefer stripped-back layout of LifeUp more than fantasy appeal of Habitica         | 1     | 4  |
|                                                                                    | 2     | 10 |
|                                                                                    | 3     | 9  |
|                                                                                    | 4     | 9  |
|                                                                                    | 5     | 2  |
| Fantasy Element of Habitica would only distract                                    | 1     | 6  |
|                                                                                    | 2     | 8  |
|                                                                                    | 3     | 9  |
|                                                                                    | 4     | 6  |
|                                                                                    | 5     | 5  |

Question 18: Which app the respondent prefers

Which Preferred

|           | N  | %     |
|-----------|----|-------|
| Habiti... | 12 | 35.3% |
| LifeU...  | 22 | 64.7% |

Question 19: Why respondents picked respective options

Why Picked \* Which Preferred Crosstabulation

| Count      |                                                                           | Which Preferred |        | Total |
|------------|---------------------------------------------------------------------------|-----------------|--------|-------|
|            |                                                                           | Habitica        | LifeUp |       |
| Why Picked |                                                                           | 5               | 10     | 15    |
|            | Looked slightly better                                                    | 0               | 1      | 1     |
|            | Closer to my setting                                                      | 0               | 1      | 1     |
|            | Like gaming and fantasy                                                   | 1               | 0      | 1     |
|            | Like idea of improving character alongside oneself                        | 1               | 0      | 1     |
|            | Like the idea                                                             | 1               | 0      | 1     |
|            | Wouldn't use any                                                          | 0               | 1      | 1     |
|            | Easier to navigate, simpler                                               | 0               | 1      | 1     |
|            | Clearer: prefer layout and sections although dislike pixelated characters | 1               | 0      | 1     |
|            | Less fantasy                                                              | 0               | 1      | 1     |
|            | More up to date                                                           | 0               | 1      | 1     |
|            | More suited to me                                                         | 0               | 1      | 1     |
|            | Less distracting                                                          | 0               | 1      | 1     |
|            | Less like a child's game                                                  | 0               | 1      | 1     |
|            | Looks cleaner and simpler                                                 | 1               | 0      | 1     |
|            | Looks neater                                                              | 0               | 1      | 1     |
|            | Makes tasks seem more fun and encourages me to do them                    | 1               | 0      | 1     |
|            | More grown up                                                             | 0               | 1      | 1     |
|            | More realistic and easier to follow, more motivational and encouraging    | 0               | 1      | 1     |
|            | Animations were better                                                    | 1               | 0      | 1     |
| Total      |                                                                           | 12              | 22     | 34    |

Question 20: Whether respondent agrees with the following statements

1 = Extremely true; 2 = Very true; 3 = Fairly true; 4 = Not very true; 5 = Not true

|                                                                   |   | Count |
|-------------------------------------------------------------------|---|-------|
| Enough Downtime during work to use app on phone frequently        | 1 | 7     |
|                                                                   | 2 | 5     |
|                                                                   | 3 | 10    |
|                                                                   | 4 | 4     |
|                                                                   | 5 | 8     |
| Activities and goals easily translateable into gamified tasks     | 1 | 7     |
|                                                                   | 2 | 4     |
|                                                                   | 3 | 8     |
|                                                                   | 4 | 6     |
|                                                                   | 5 | 9     |
| Too Busy at work to make good use of the app                      | 1 | 6     |
|                                                                   | 2 | 8     |
|                                                                   | 3 | 6     |
|                                                                   | 4 | 11    |
|                                                                   | 5 | 3     |
| Easy time potentially getting coworkers to form groups on the app | 1 | 5     |
|                                                                   | 2 | 1     |
|                                                                   | 3 | 4     |
|                                                                   | 4 | 9     |
|                                                                   | 5 | 15    |
| Fine without gamification and don't need it                       | 1 | 5     |
|                                                                   | 2 | 7     |
|                                                                   | 3 | 16    |
|                                                                   | 4 | 5     |
|                                                                   | 5 | 1     |
| Just see it as another gimmick/fad and don't take it seriously    | 1 | 8     |
|                                                                   | 2 | 7     |
|                                                                   | 3 | 8     |
|                                                                   | 4 | 10    |
|                                                                   | 5 | 1     |
| Able to keep using the application post-novelty stage             | 1 | 2     |
|                                                                   | 2 | 6     |
|                                                                   | 3 | 8     |
|                                                                   | 4 | 9     |
|                                                                   | 5 | 9     |

Question 21: Whether respondent envisions gamification apps helping elements of resilience

|                   |       | Count |
|-------------------|-------|-------|
| APS Would Improve | Yes   | 8     |
|                   | Maybe | 13    |
|                   | No    | 13    |
| TE Would Improve  | Yes   | 11    |
|                   | Maybe | 12    |
|                   | No    | 11    |
| SM Would Improve  | Yes   | 13    |
|                   | Maybe | 9     |
|                   | No    | 12    |
| B Would Improve   | Yes   | 9     |
|                   | Maybe | 13    |
|                   | No    | 12    |

Question 22: Chance that respondents will try gamification apps at their job

#### Chance Of Trying

|    | N | %     |
|----|---|-------|
| 0  | 8 | 23.5% |
| 1  | 2 | 5.9%  |
| 2  | 4 | 11.8% |
| 3  | 2 | 5.9%  |
| 4  | 1 | 2.9%  |
| 5  | 4 | 11.8% |
| 6  | 4 | 11.8% |
| 7  | 6 | 17.6% |
| 9  | 2 | 5.9%  |
| 10 | 1 | 2.9%  |

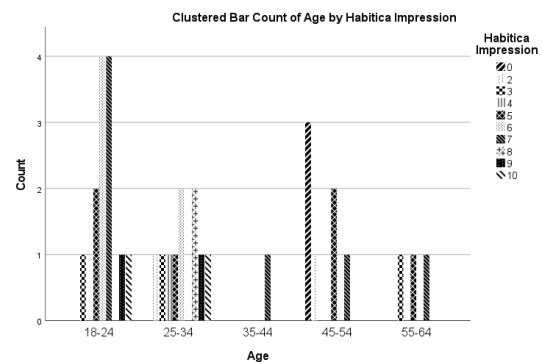
## 6.3 Analysis of findings as per hypotheses

In this section, findings will be analysed with a brief discussion where necessary to test each sub-hypothesis.

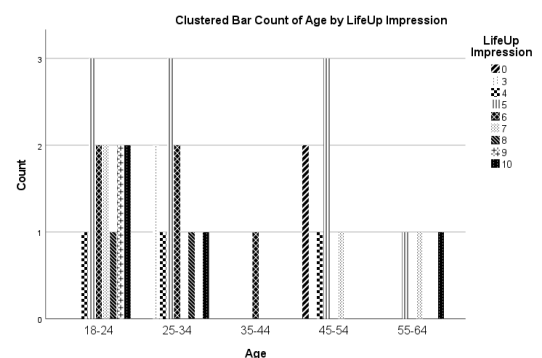
### 6.3.1 H<sub>1</sub>

“Age plays a significant part in the receptiveness of employees to gamification apps.”

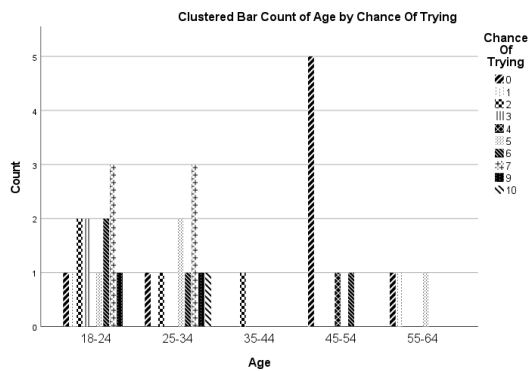
To begin testing this hypothesis, impressions of both apps and ages will be crosscontabulated.



Although the respondent base is primarily composed of younger people, a small trend can be seen in those aged 45-64; no respondent gave Habitica a rating higher than 7 and the majority of those aged 45-54 rate the application under 5. Conversely, young people had a more favourable view of the application, with most rating 6 or 7 and a few outliers voting above.

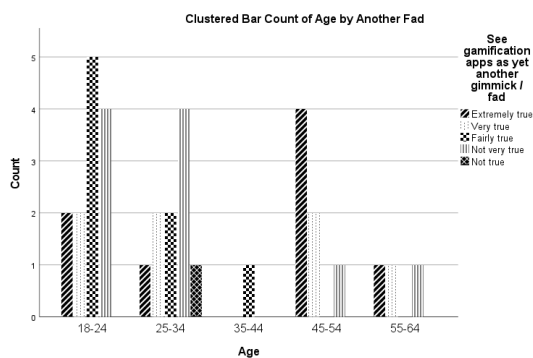


Ratings for LifeUp showed greater uniformity across the scale for young people than those for Habitica. However, respondents aged 45-54 expressed a similar dislike for the application as with Habitica; only one rated it 7 while a majority were less impressed.



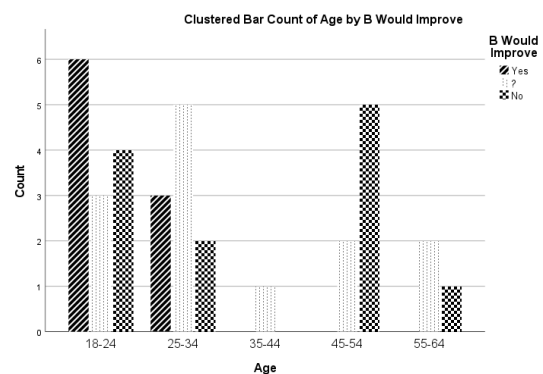
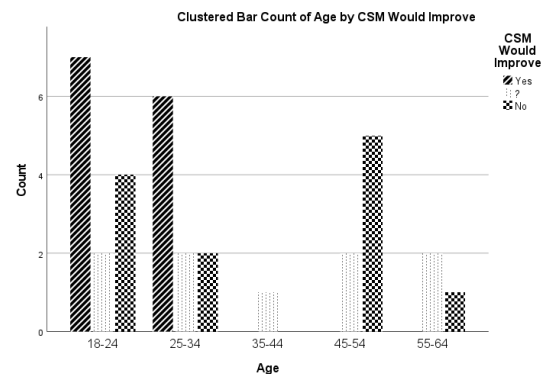
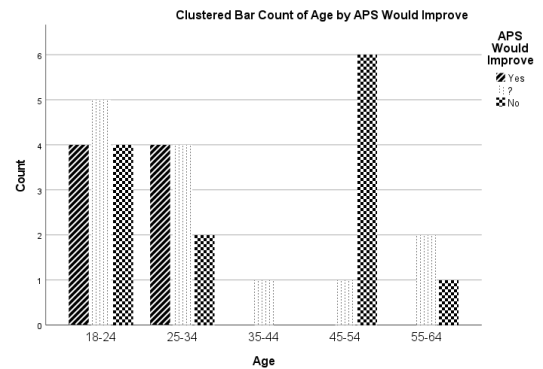
The metric representing one's chance of trying gamification was bleaker still; while the 18-24 range showed a bell curve-type receptiveness, with most rating 7, the 45-54 range overwhelmingly rated 0, hinting at a universal reluctance to accept gamification among this age group.

Why could this be? A look at respondents' opinions of gamification apps by age group could be telling.



This chart shows different views across age brackets on the usefulness of gamification apps. When shown a statement that gamification apps are just another fad, the 18-24 age bracket were neutral; conversely, the 45-54 age bracket overwhelmingly agreed.

Perhaps the reason why this is so lies in the opinions of respondents regarding what gamification could do for them. For this, answers to Q21 will be examined.

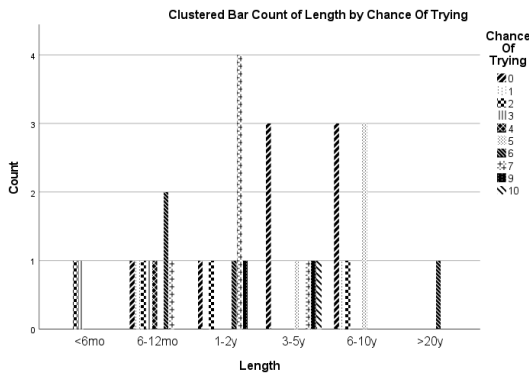


Each chart above reflects the same issue: while younger respondents are more optimistic regarding skill improvements via gamification apps, those aged 45-54 overwhelmingly disagreed. This shows that this age group believes that they have much less to gain from using these apps, therefore proving  $H_1$  correct in that age does play a large part in the receptiveness to gaming applications.

### 6.3.2 H<sub>2</sub>

“Those who have been in the same job for longer periods may not receive the same effect from gamification apps as others.”

To gauge the truthfulness of this hypothesis, respondent employment length (Q4) will be compared to receptiveness to gamification apps using a similar method.

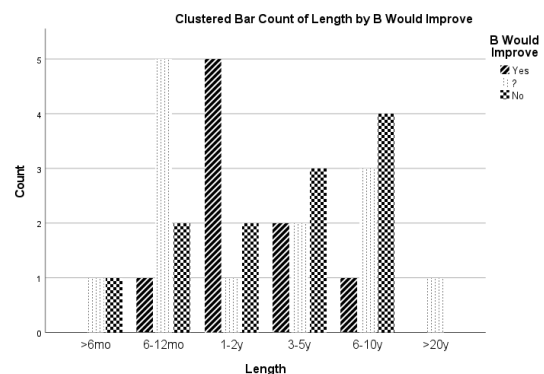
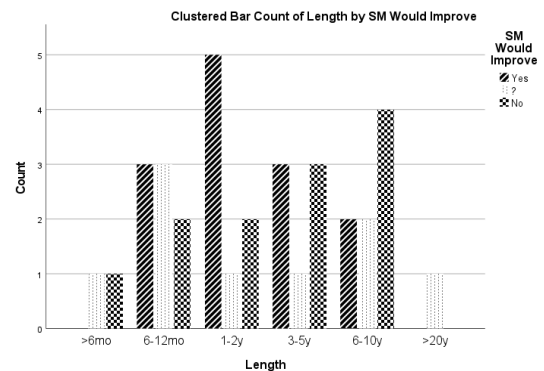
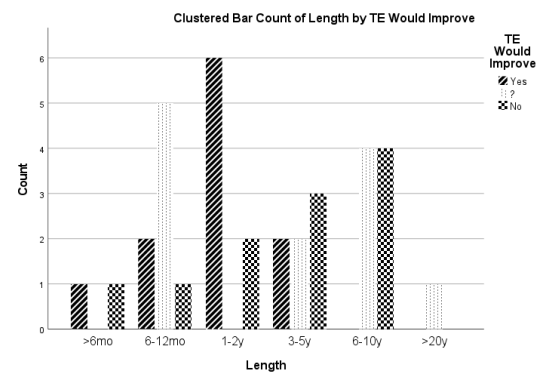
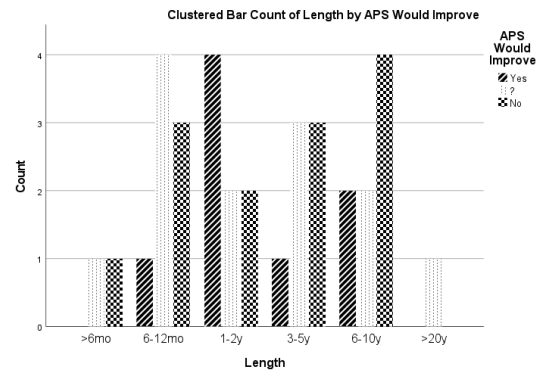


The most striking observations from this graph at first glance are the overwhelming ratings of 7 among those employed for 1-2 years and 0 for those employed for 3-5 years. Because bars in this graph are difficult to associate with an X axis value, responses will be converted into a mean score.

| Employment length bracket | Sum of ratings | M    |
|---------------------------|----------------|------|
| <6mo                      | 5              | 2.5  |
| 6-12mo                    | 29             | 3.63 |
| 1-2y                      | 45             | 5.63 |
| 3-5y                      | 31             | 4.43 |
| 6-10y                     | 18             | 2.25 |
| >20y                      | 6              | 6    |

The above chart shows that willingness to try gamification peaked at 1-2 years of employment; the >20y bracket will be disregarded due there being only one respondent. An interesting observation from this chart is that willingness declined in newer and older employees compared to those in employment for 1-2 years. A possible explanation could be that newer employees are too occupied with learning the ropes of their employment to want gamification, while long-time employees know the ropes and don't

need gamification. To test this explanation, age brackets will be compared with the extent to which respondents believe that gamification could improve elements of their resilience (Q21).



These graphs show that, for all areas of resilience, there is some doubt expressed by respondents in the ability of gamification apps to improve on any of their elements of resilience. However, the greatest 'Yes' voters were those in the 1-2 years

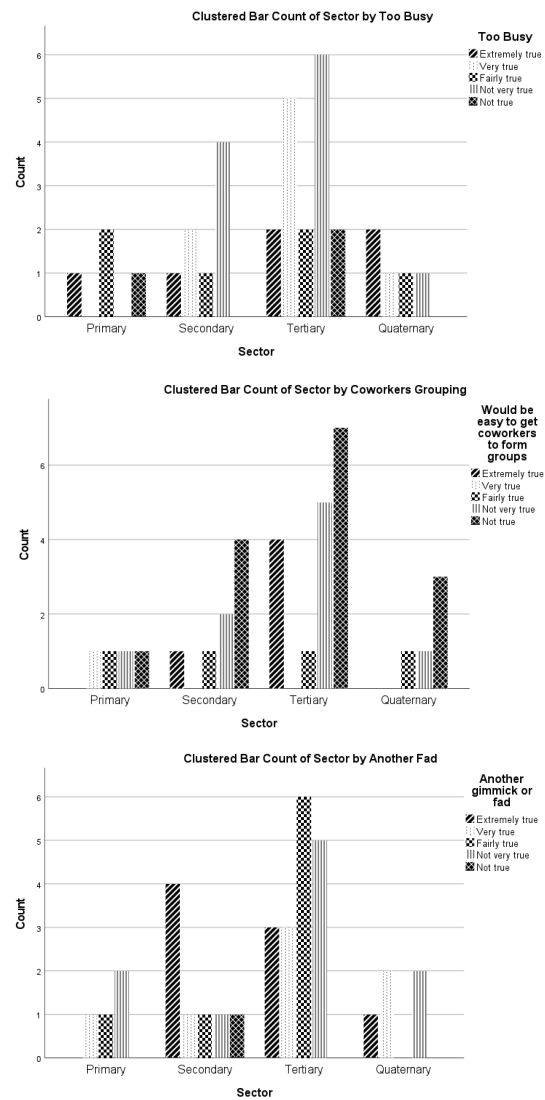
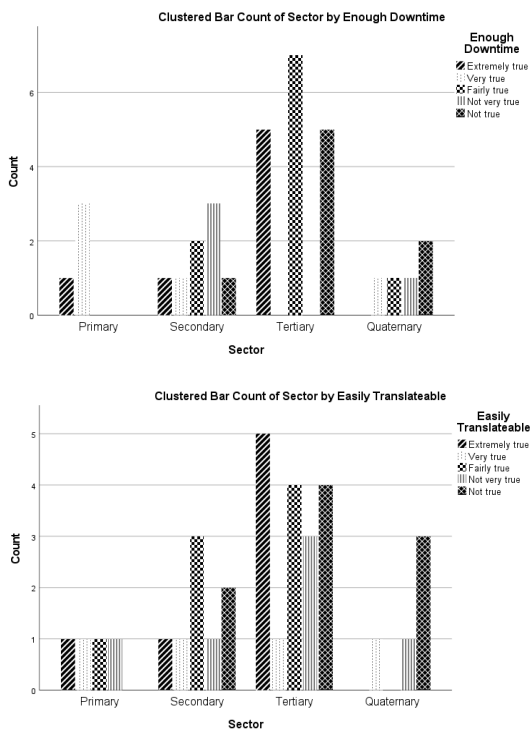
bracket. This backs up the previous explanation that those in mid-length employment would benefit the most. It, however, also simultaneously refutes it by showing that those in employment for the least voted that they would have among the least to gain from these apps, showing that they too would not need them.

Overall, because this hypothesis did not suggest a bell curve of effectiveness by employment length — despite being correct in the assertion that longer employment length reduces the need for gamification — it has been rejected.

### 6.3.3 H<sub>3</sub>

“Employment in tertiary and quaternary sectors is easier to gamify than in primary and secondary sectors.”

To test this hypothesis, respondents’ employment sector (Q5) will be compared with answers to Q20.



The above graphs present a variety of clues to be analysed. A point to note, however, is that the majority of respondents were employed in the tertiary sector. Because of this, responses will be broken down into mean figures. Note that the ‘Sector’ column has abbreviated each cell — for instance, Easily Translatable becomes ET. The following code was used: Extremely true = 4; Very true = 3; Fairly true = 2; Not very true = 1; Not true = 0.

| Sector | ED M | ET M | TB M | CG M | AF M |
|--------|------|------|------|------|------|
| Pri    | 3.25 | 2.5  | 2    | 1.5  | 1.75 |
| Sec    | 1.88 | 1.75 | 2    | 1    | 2.75 |
| Ter    | 2    | 2.06 | 1.94 | 1.35 | 2.24 |
| Qua    | 1.2  | 0.8  | 2.8  | 0.6  | 2.4  |

As seen in the above mean chart, respondents across every sector have taken a largely

middle-of-the-road approach to answering each question; the most polarised results are the primary sector's response in agreement to the statement of having enough downtime and the quaternary sector's response in extreme disagreement with the statement that they could easily persuade their coworkers to join the application.

An interesting point is that primary sector respondents' mean response to the statement of easily translatable tasks was slight agreement as well as secondary sector respondents' mean response of slight disagreement, as opposed to the vehement disagreement expected. Furthermore, these two sectors reported having enough downtime in addition to being perfectly neutral on the topic of being too busy. These respondents were also similarly neutral on the topic of whether the idea of gamification is a fad.

On the grounds of these scores being equally as favourable as those of tertiary sector respondents, this hypothesis is rejected.

#### 6.3.4 H<sub>4</sub>

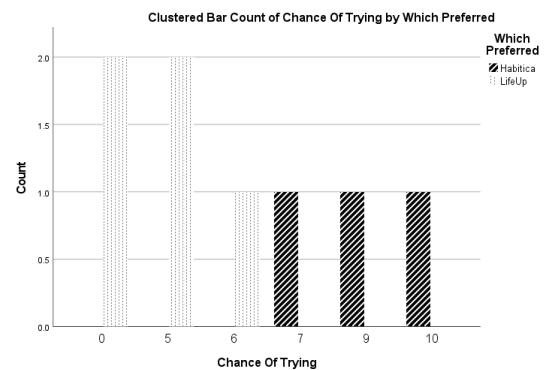
"Those with greater job stress may be more receptive to gamification for its stress-abating potential."

The phrase 'stress-abating potential' refers to the long term effect of their usage, in that as one's skills increase, so too will the ease of performing their duties in employment.

To test this hypothesis, respondent SIG scores (Q9, Q10) will be filtered to find the 5 individuals with the greatest and lowest stress levels for each of the two SIG scales, comparing the receptiveness of each to gamification. As a note, SIG scores will be calculated using the method given by Stanton *et al.* (2001); No = 0; ? = 1.5; Yes = 3. Reverse coded items were factored in.

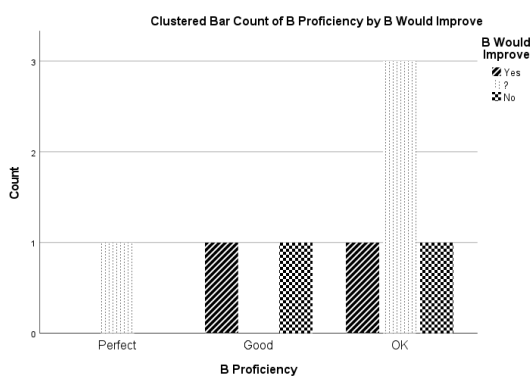
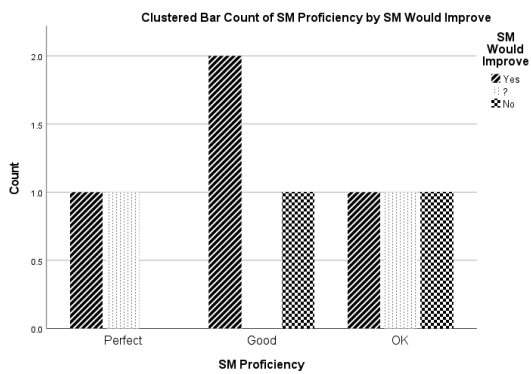
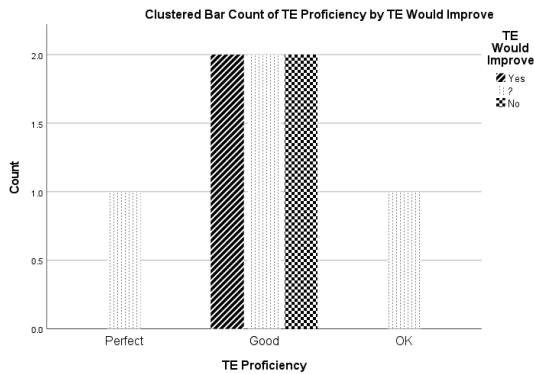
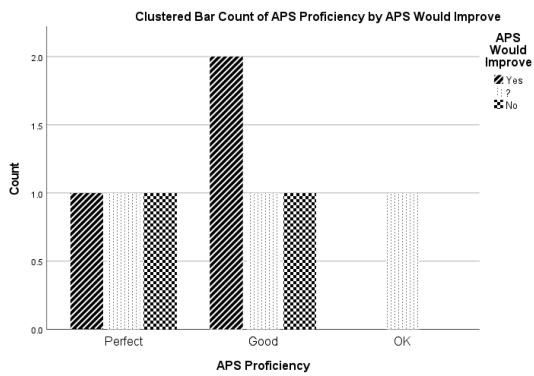
| Respondent ID | SIG 1   |        | SIG 2   |        |
|---------------|---------|--------|---------|--------|
|               | Highest | Lowest | Highest | Lowest |
| 1             | 15      |        |         |        |
| 2             |         | -3     |         | -6     |
| 3             |         | 3      |         |        |
| 5             |         | -6     |         | -9     |
| 6             |         |        |         | -9     |
| 10            | 15      |        |         |        |
| 13            | 15      |        | 10.5    |        |
| 16            | 15      |        |         |        |
| 19            |         | 1.5    |         | -6     |
| 21            | 15      |        | 12      |        |
| 22            |         |        | 10.5    |        |
| 29            |         |        |         | -6     |
| 33            |         | 1.5    |         |        |
| 35            |         |        | 10.5    |        |
| 36            |         |        | 10.5    |        |

The following graphs show the receptiveness of the most stressed individuals to gamification:



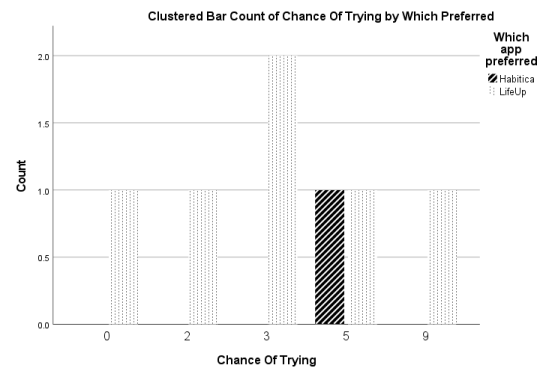
As shown here, the most stressed respondents' chance of trying gamification apps is fairly uniform with a slight bias towards 5 and 0. The mean result taken from this graph is 5.25, indicating relative neutrality. There is a slight bias toward voting for LifeUp as compared to Habitica.

The graphs below judge the perceived resilience skills possessed by these respondents.



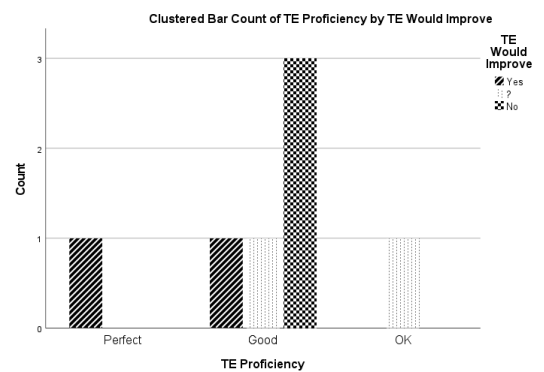
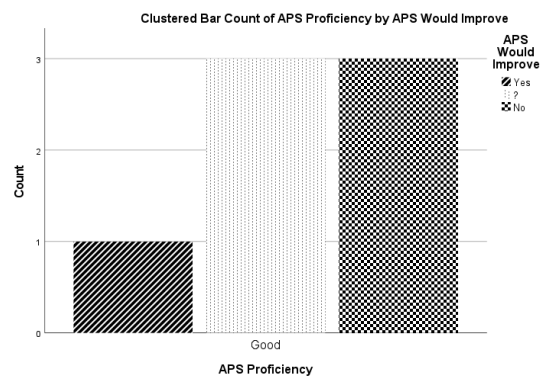
These graphs show that these respondents rate their skills as generally quite good; not a single respondent rated any skills below ‘OK’. Their perceived potential skill gains from gamification were neutral overall with uniform voting throughout.

Shifting focus to the least stressed respondents, the same graphs will be used.



For this graph, the mean vote was 3.8 — a more negative score — and a greater number of these respondents preferred the layout of LifeUp.

Next, the perceived resilience skills possessed by these respondents will be judged:





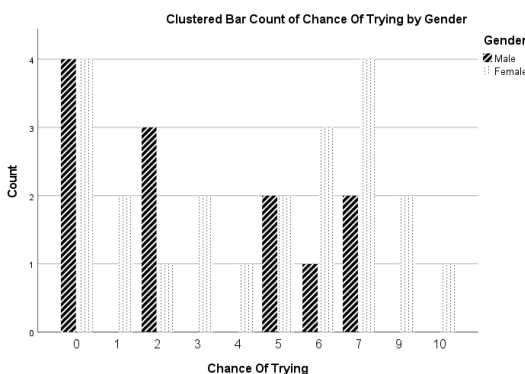
The skills possessed by the least stressed respondents were worse than those of the most stressed. However, as expected, a majority voted either that their skills would not improve as a result of the usage of these applications or that they were unsure.

Because of the trends somewhat agreeing with the content of the hypothesis, it can be tentatively accepted. This, however, is subject to no new data disproving this conclusion later.

### 6.3.5 H<sub>5</sub>

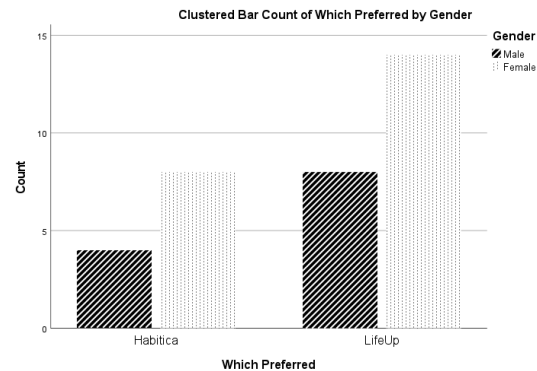
“There exists no gender difference in receptiveness to gamification apps.”

To test this hypothesis, respondents’ gender in relation to other metrics will be analysed.

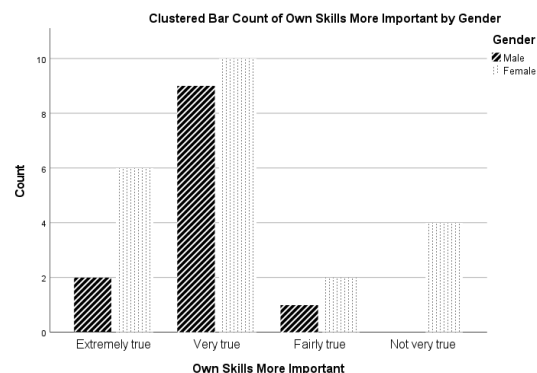
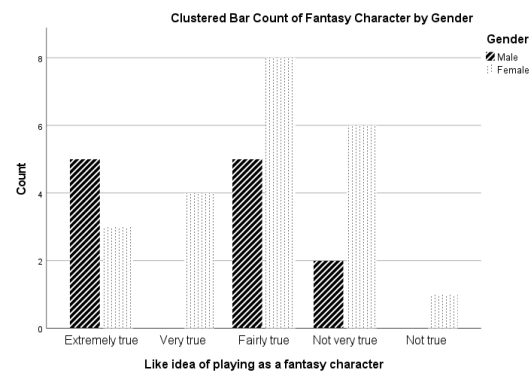


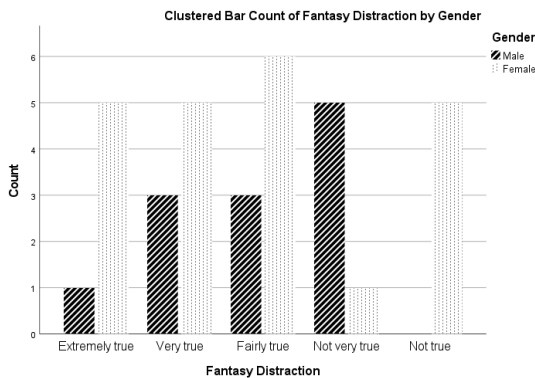
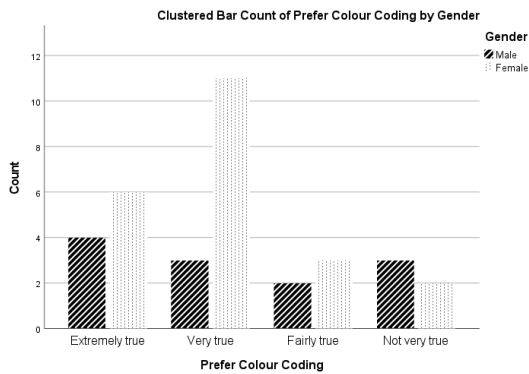
The above graph shows a declining trend in male respondents, with most rating their chance of trying the app 0. The opposite is true for female respondents; a large number of responses were in the range of 5-9. The mean rating for men was 3, as opposed to 4.5 for women, showing only a small difference.

The following graph will examine differences in app preferences (Q18) by gender.



The above chart shows that LifeUp is universally preferred to Habitica; comments left in Q19 indicate that several people thought that LifeUp was more ‘grown up’ while a few respondents thought that the fantasy element of the former might motivate them. Next, answers to Q17 will be analysed by gender: whether respondents like the idea of playing as a fantasy character, whether they think their own skills are more important than levelling up a character, whether they prefer colour coded skills and whether they believe fantasy to be a distraction.





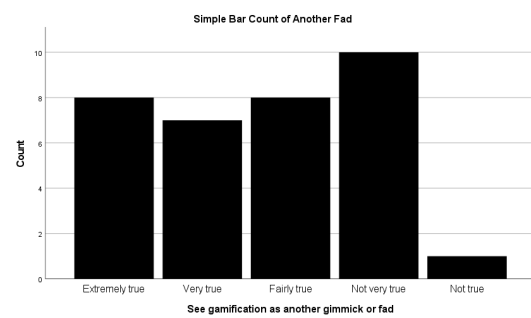
The above charts show a difference between genders. Regarding the idea of playing as a fantasy character, men were more receptive although no gender expressed dislike. Regarding the importance of one's own skills, men and women agreed equally. On preferring colour coding, women were in general agreement while men were split on the issue. On the last statement, a negative trend could be seen in men as more voted against it; women, on the other hand, were in general agreement with the statement.

With this information, the hypothesis can be rejected on the grounds that clear differences between genders exist — not only between receptiveness for the two apps shown to them but also for the chance of trying the applications in general.

### 6.3.6 H<sub>6</sub>

“People take gamification seriously instead of seeing it as a trend or fad.”

The last sub-hypothesis can easily be tested by analysing respondents' answers to Q20.



This graph shows a clear majority voting that they believe gamification to be another fad. Using the following codes, the mean response will be calculated from this graph;

Extremely true = 4; Very true = 3; Fairly true = 2; Not very true = 1; Not true = 0.

| Answer     | N  | N x code | M    |
|------------|----|----------|------|
| E. True    | 8  | 32       |      |
| V. True    | 7  | 21       |      |
| F. True    | 8  | 16       |      |
| N. V. True | 10 | 10       |      |
| N. True    | 1  | 0        |      |
| Total      | 34 | 79       | 2.32 |

The calculated mean corresponds roughly with ‘fairly true’, if a little towards ‘very true’; this indicates that respondents were largely neutral although leaned slightly toward agreement.

With this data, it's clear to see that people, while not explicitly disregarding gamification apps as a gimmick, do not take them seriously either. Because of this, the hypothesis can be rejected but only on the basis that public opinion does not change in the future. If the gamification movement can convince the wider public to have a change of heart, this hypothesis could stand to be accepted.

## 6.4 Master hypothesis

“Gamification apps are capable of improving all employees' resilience in the workplace to an extent.”

Referring back to the sub-hypotheses, those accepted were H<sub>1</sub> and H<sub>4</sub> while those rejected were H<sub>2</sub>, H<sub>3</sub>, H<sub>5</sub> and H<sub>6</sub>. This shows that age, length of employment, job stress and gender each play a significant part in one's receptiveness to

gamification applications. Despite this setback for gamification apps, this hasn't shown that the affected groups simply aren't capable of extracting any benefit from use of the app. Because anyone is capable of using work

gamification in some way to potentially improve their resilience in a way personal to them the master hypothesis has been accepted and the null hypothesis rejected.

## 7.0 Discussion of limitations of the study

This section will be relatively small, discussing some of the shortcomings in the methodology and analysis involved in this dissertation.

Firstly, the biggest shortcoming in the methodology is the usage of snowball sampling. This method was used primarily for convenience at the expense of a guarantee of a diverse and workable respondent base. Although the resulting respondent base was fairly diverse, the shortcomings of both the sampling method and the lead researcher's foresight led to a base primarily of women and young people, providing rich detail for these groups at the expense of others. This made the meanings of some comparisons and cross-tabulations difficult to decipher which would not have been so much of an issue had due diligence been given to sampling. Ultimately, however, it is not expected that a more proper sampling method would lead to a different master hypothesis outcome than the acceptance already in place; in fact, a greater diversity and wealth of backgrounds would serve to really hit home the message of the proven hypothesis in that anyone can use and benefit from hypothesis to an extent.

A more specific limitation of the study is the method of testing  $H_4$  (the sub-hypothesis about stress). An inefficient method of calculating the top and bottom individuals for each of the two SIG scores was used; the number was thus set at 5 for each to save time. This decision was, rather expectedly, at the expense of the quality of the

subsequent findings due to an extremely small applicable respondent base of up to 10 for each cross-tabulation. This is likely why the most stressed respondents' perceived potential skill gains were so uniformly voted on and possibly why the least stressed respondents' self-reported resilience skill sets were, unexpectedly, comparatively underdeveloped given the common sense argument that greater development of skill sets in a workplace may reduce occupational stress.

A final limitation of the study was the simple fact that an overabundance of questions were asked in the survey completed by respondents. Many of these questions even partially overlapped in content and nature, leading some questions to be discounted as redundant during analysis. This overabundance had a two-fold effect: firstly in that an overabundance of metrics with which to test a hypothesis led at times to 'analysis paralysis' and at others to multiple forms of analysis 'stepping on each other's toes', for lack of a more academic phrase; secondly, this overabundance of questions led no doubt to some respondents becoming bored and rushing through to reach the end. Both of these factors combined could theoretically have led to a lower quality final analysis.

## 8.0 Conclusion and new research question

Concluding this dissertation, this work set out to deductively explore the relatively uncharted territory regarding the use of gamification apps in the workplace with the use of hypotheses. The findings from the exploration of each hypothesis proved to be interesting: gender unexpectedly had an effect on the way in which users reap the benefits of gamification — for instance, men were shown to prefer fantasy elements to an extent while women found them more distracting; furthermore, another interesting find was that those employed in the primary and secondary sector found their work just as easy to gamify as those employed in the tertiary and quaternary sector, which was an unexpected result from this research. Overall, the overarching theme — backed up by the acceptance of the master hypothesis — is that workplace gamification is an exciting opportunity that shouldn't be passed over by employers or by employees looking for a

bottom-up style of system. The research has shown that, while people are still reluctant to accept a movement not in popular knowledge, people could potentially stand to gain many resilience-based skills in the workplace if uptake should increase.

Following on from this study, a research question that could be tackled in the future may be whether gamification apps, applied in the workplace, can help corporations achieve their financial targets in usage trials through enhanced employee productivity and creativity. This would nicely complement the nature and findings of this dissertation by representing the other side of the corporate coin; looking from the bottom up, as here, and looking from the top down, as with this suggestion.

Word count: 10044

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