GAMIFICATION AND BEHAVIOUR CHANGE: UNDERSTANDING THE MECHANISM AND ITS IMPLICATIONS FOR SOCIAL MARKETING.

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Abstract

Social marketing research has typically concentrated on campaigns with purely behavioural products, reflecting its focus on behaviour change (Lefebvre, 2011). However, this has limited exploration of tangible product-based strategies (Edgar et al., 2017; Thackeray et al., 2012). This limitation is particularly apparent in the domain of technology-based interventions, such as mobile phone apps. While these digital products offer social marketers excellent reach, accessibility and cost efficacy (Akter & Ray, 2011), there is still limited understanding of how to avoid the unacceptably high attrition rates common to this product type (Patrick et al., 2016). To overcome this, some social marketers have started to investigate ways to transfer the appeal of digital video games to non-game contexts via the use of game mechanics such as scoring systems, narrative and achievements (Mulcahy et al., 2015; Mitchell et al., 2017).

The use of game mechanics in this way is referred to as *gamification,* defined as "a process of enhancing a service with affordances for gameful experiences in order to support user's overall value creation" (Huotari & Hamari, 2012, p. 19). Commercial examples of this product type include the popular Fitocracy, Super Better and Pokémon Go. While research largely supports the use of gamification to support behaviour change (Hamari et al*.,* 2014) improved understanding of how gamification achieves outcomes or what factors contribute to its success is necessary (Nacke & Deterding, 2017). Consequently, this thesis addresses the following broad research question:

What are the key determinates of consumers' use of gamification products?

Following a literature review of extant social marketing and gamification theory, this thesis identifies Self-Determination Theory (SDT) and its sub-theory cognitive evaluation theory (CET) as the primary theoretical lens through which gamification research has been conducted (Deterding, 2015; Seaborn & Fels, 2015). SDT has proved useful in identifying the role of psychological needs satisfaction and intrinsic motivation (motivation inherent to a behaviour such as enjoyment/interest) in supporting maintained gamification behavioural outcomes (Hamari et al., 2014;

Ryan, Rigby, & Przybylski, 2006). However, limited use of validated multilevel scales and differing results between gamification contexts have brought the utility of SDT into question (Nacke & Deterding, 2017). Consequently, the first sub-research question (RQ1) addressed by this thesis was:

To what extent does SDT explain consumers' use of gamification products?

The literature review highlights that the current use of SDT in gamification research has largely ignored mediators such as the extrinsic factors of the environment being gamified (Nacke & Deterding, 2017). That has proved a major limitation in understanding the range of results in gamification literature (Mekler et al., 2017; Mitchell et al., 2017). In identifying the impact of these extrinsic (motivation external to a behaviour such as social pressure or rewards/punishments) sources of motivation, this thesis suggests that a sub-theory of SDT, organismic integration theory (OIT), may prove useful in establishing a taxonomy of individual responses to these motivations (Deci & Ryan, 2002; Vansteenkiste, Niemiec, & Soenens, 2010). Thus, the second sub-research question (RQ2) addressed by this thesis was:

To what extent does OIT explain consumers' use of gamification products?

To address these questions, this thesis employed a two-study mixed-methods research program consisting of qualitative interviews and online quantitative surveys of users of mobile based gamification products in health, exercise and workplace productivity. The first study used qualitative analysis of semi-structured interviews conducted with 20 users of gamified apps in the physical health context to establish their perspectives on the determinates of their continued use or discontinuation of gamification products. This data was analysed using inductive and deductive thematic analysis and the findings of this study were used to develop a model of gamification use intention and antecedents. Study Two quantitatively tested this model via structural equation modelling on data from users of physical activity (N=223) and workplace productivity (N=291) gamification products.

The results of these two studies provide support for the capacity of SDT to explain consumers' use of gamification products, with the satisfaction of autonomy and competency needs satisfaction associated with behavioural intention through the

facilitation of intrinsic motivation. However, the results also highlight that intrinsic motivation on its own is an insufficient explanation to gamification outcomes, as needs satisfaction is influenced by the regulatory style users adopt in response to environmental factors. More internalised regulatory styles were associated with needs satisfaction, while externalised styles undermined them. Some unexpected results were also discovered, with relatedness needs satisfaction not significantly impacting on intrinsic motivation and introjected regulation negatively impacting needs satisfaction in the physical exercise context but not in the workplace context. These results highlight the need for further research into the role of intrinsic and extrinsic motivation in gamification outcomes.

This research contributes to a deeper understanding of how context influences the way that social marketing products such as gamification are received by users. Specifically, through OIT this research presents a validated way to measure and assess the impact of external motivation on gamification outcomes, addressing the limited consideration of context in previous studies. Thus, this thesis provides empirical support for the use of SDT and its sub-theories OIT and CET within gamification research and highlights the need for further research into the role of external motivation in social marketing products.

Keywords: Gamification, Gamified, Intrinsic Motivation, Extrinsic Motivation, Social Marketing, Self-Determination Theory, Mobile App, Internal Marketing, Cognitive Evaluation Theory, Organismic Integration Theory.

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Statement of Original Authorship

The work contained in this thesis has not been previously submitted to meet requirements for an award at this or any other higher education institution. To the best of my knowledge and belief, the thesis contains no material previously published or written by another person except where due reference is made.

Signature: QUT Verified Signature

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List of Abbreviations

Term	Abbreviation
Self-Determination Theory	SDT
Mobile Phone Application	App
Cognitive Evaluation Theory	CET
Organismic Integration Theory	OIT
Overall Research Question	ORQ
Sub-Research Question One	RQ1
Sub-Research Question Two	RQ2
Transtheoretical Model of Behaviour Change	TTM
Structural Equation Modelling	SEM
Average Variance Extracted	AVE
Maximum Shared Variance	MSV
Player Experience of Need Satisfaction	PENS

Chapter 1: Introduction

This chapter provides an overview of this thesis, which aims to examine the determinants of consumers' use of gamification products from a social marketing perspective. An outline of the rationale for this research is presented in Section 1.1. Following this, a summary of the research aims of this thesis is given in Section 1.2. The subsequent Section 1.3 provides overview of the two-study mixed methodology research program developed to address the research questions. How the contributions of this research apply to theory and practice are then provided in Section 1.4. Finally, this chapter provides an overview of the structure of this thesis in Section 1.5, followed by a brief conclusion in Section 1.6.

1.1 Research Overview

The use of marketing tools by governments and social change agents has a long history as an incidental practice (Wilkie & Moore, 2003), but the formal beginnings of what would become known as 'Social Marketing' are largely attributed to Wiebe's (1951) question: "*Why can't you sell brotherhood ... like you can sell soap?*" (p. 679). As research in this field grew it became apparent that the ultimate goal of social marketing was, as with commercial marketing, the influence of behaviour (Andreasen, 2002, 2003). Reflecting this, most modern definitions of social marketing focus on behaviour change. Most recently, the International Social Marketing Association (2016) proposed a consensus definition as follows: "Social marketing seeks to develop and integrate marketing concepts with other approaches to influence behaviours that benefit individuals and communities for the greater social good". This definition of social marketing is adopted by this study.

Many aspects of social marketing remain similar to those in commercial marketing, in particular the use of marketing mix (comprised of product, promotion, place and price) as the cornerstone of its research and practice (Luca & Suggs, 2010; Thackeray & McCormack Brown, 2010). However, the definitions of these components of the marketing mix are postulated to vary from a commercial marketing context (Lee & Kotler, 2019). While the product offering traditionally refers to the goods and services offering of the firm, for social marketers it can also include the features of the behavioural offering itself to enable conceptualisation of social marketing campaigns with no good or services offering

(Andreasen, 2004; Gordon, 2011). This conceptualisation of product reflects the absolute importance of behaviour to social marketing as it is behavioural outcomes rather than product distribution that is the measure of social marketing's success (Lefebvre, 2011). This has led to the focus of the social marketing literature on the determinates of consumers' engagement in various social marketing 'products' such as health promotion, injury prevention, environmental protection and community mobilisation (volunteering) (Lee & Kotler, 2019).

One of the most practically significant differences between social marketing products and commercial marketing products, is that the 'consumption' of these products is often more difficult with less obvious benefits that also take longer to accumulate (Dibb & Carrigan, 2013; Hastings, 2003). Exercising, for example, can be challenging and may require a sustained effort over a long period of time before delivering any tangible benefits to the consumer. This lack of an obvious and immediate positive exchange across a range of social marketing products negatively impacts consumers' motivation to perform the behaviour (Rothschild, 1999; Binney, Hall, & Shaw, 2003). This is particularly detrimental to maintenance of the behaviour, given the importance that individuals place on their satisfaction with obtained outcomes in their decision to continue the behaviour (Rothman, 2000). Given the necessity of maintained behaviour change in a wide variety of social marketing domains (Dibb & Carrigan, 2013), social marketers are being increasingly called upon to make positive sustained relationships and exchange a central feature of their behavioural interventions (French & Russell-Bennett, 2015).

While considerable behavioural impact can be derived from altering the perception of benefits and value derived from a behaviour (Andreasen, 2004; Bloom & Novelli, 1981), there remains a critical role for tangible goods and services to support behaviour change through the provision of additional benefits or reducing behavioural barriers (Smith, 2009). However, the frequent interchangeability in conceptualisation of product as behaviour and product as tangible goods and services supporting the behaviour in social marketing literature has undermined the focus on the product component of the marketing mix (Edgar, Huhman & Miller, 2017; Thackeray, Fulkerson, & Neiger, 2012). Rothschild (2009) argues the conceptualisation of 'product' as the behaviour being targeted results in the impractical merging of the desired dependent variable of behaviour change with the independent

variables of the marketing mix and has called for social marketers to conceptualise product as the tangible offerings provided to support the behavioural change. On this basis Lee and Kotler (2019) have promoted the use of a three-tiered conceptualisation of product as core product (benefits of the behaviour), actual product (tangible goods or services supporting the behaviour), and augmented product (non-physical components of the actual product).

Increasingly social marketing 'actual products' are less physical and more virtual in nature and delivery, taking the form of user controlled technological applications (Whittaker, 2012). Digital services are very appealing to social marketers because of the ease with which they can be up-scaled and their cost efficacy, helping address the prohibitively large costs typically associated with long term support of social marketing interventions that include physical products (Akter & Ray, 2011; Bloom & Novelli, 1981; Lefebvre, 2009; Whittaker, 2012). This drive for digital actual products also reflects the growth in technology uptake amongst consumers, particularly in terms of mobile phones. There are high levels of stabilised uptake and use of mobile services across all age groups, representing a broad shift toward mobile technology across the developed world (Anderson, 2019).

One such emerging digital product offering is *gamification,* described as "a process of enhancing a service with affordances for gameful experiences in order to support user's overall value creation" (Huotari & Hamari, 2012, p. 19). Gamification involves the use of game design elements or mechanics, such as scoring systems and achievement/reward features, in non-gaming contexts in a process often referred to as 'gamifying', resulting in a 'gamified' behaviour or product (Deterding et al., 2011a). While not all gamification involves digital products, they commonly do. A commercial example of gamification within a social marketing context is the mobile application 'The Walk' by Six to Start (2013). This mobile phone app encourages physical activity through the creation of a narrative in which the user is on the run from a shadowy conspiracy, using tracking data from the user's phone to simulate the collection of supplies and information in the virtual world via their physical movement through the real world. Mechanically, the player is rewarded with audio-clips or fragments of text the longer they walk, with greater rewards for longer periods of walking without stopping. There are numerous other successful applications of gamification in social marketing domains such as energy conservation (Gustafsson, Katzeff & Band, 2009; Russell-Bennett et al, 2016) and physical activity (Hamari & Koivisto, 2013). Gamification is a

particularly appealing digital service to social marketers, as the provision of virtual rewards and engaging gameplay may help generate positive value for users and compensate for the limited attractiveness of the social marketing behaviour being targeted (Mulcahy, Russell-Bennett, & Rundle-Thiele, 2015).

The meta-analysis by Hamari, Koivisto and Sarsa (2014) largely supports the use of gamification to foster behaviour change across a variety of contexts, however, it also highlights a dearth of research on the mechanism for the observed behavioural impact of gamification. While recent research has sought to address this gap, there still does not exist a consensus on how gamification achieves outcomes or what factors contribute to its success (Nacke & Deterding, 2017). In particular, while gamification has been shown to support behavioural maintenance in social marketing contexts, the determinates of the continued use of gamification products are still unclear (Mitchell, Schuster, & Drennan, 2017). Gaining insight into these determinates is vital to understanding the use of this tool in social marketing, given that social marketing behaviours often must be maintained for long periods of time (Bloom & Novelli, 1981; Hastings, 2007) and that a common limitation of existing digital services is high attrition rates (Patrick et al., 2016; Eysenbach, 2005). Thus, the overall research question (ORQ) of this thesis is:

What are the key determinates of consumers' use of gamification products?

Investigating this gap has been a key focus of recent gamification research, and while the ongoing focus on game features or mechanics limits examination of a wide range of possible antecedents, it has shed some light on theoretical perspectives that may aid in further exploration (Nacke & Deterding, 2017). Drawing from research into voluntary video game use, a key hypothesis that has emerged is that gamification's behavioural impact is underpinned by its capacity to create intrinsically motivating game-like experiences (Hamari, 2017; Mekler, Brühlmann, Tuch, & Opwis, 2015; Seaborn & Fels, 2015). Intrinsic motivation refers to motivation inherent to engaging in a behaviour (such as enjoyment/interest) and is a major component of the macro theory of human motivation known as Self-Determination Theory (SDT), in which intrinsic motivation arises from the innate drive humans have to satisfy psychological needs (Deci & Ryan, 2002). Owing to this theory's capacity to explain and predict intrinsic motivation together with its historical association with video game

research, SDT has emerged as the primary theoretical lens for gamification research (Deterding, 2015; Seaborn & Fels, 2015). Extant literature provides evidence for the premise that intrinsic motivation can support positive gamification behavioural outcomes (Deterding et al., 2011b; Hamari et al., 2014; Peng et al., 2012; Ryan, Rigby, & Przybylski, 2006). However, it has not adequately explained why some gamification interventions have had behavioural impact despite lacking impact on intrinsic motivation (Mekler et al., 2017; Mitchell et al., 2017) or why gamification in some contexts has been shown to undermine intrinsic motivation (Hanus & Fox, 2015). Consequently, to clarify the area of inquiry it is necessary to address the first sub-research question (RQ1) underpinning this thesis:

To what extent does SDT explain consumers' use of gamification products?

A major limitation of previous studies is their lack of focus on psychological mediators such as the extrinsic factors of the environment being gamified, and this has limited their ability to address the above research question (Nacke & Deterding, 2017). Several researchers have thus called for the use of SDT in gamification research to be expanded to incorporate measures of these psychological determinates conceptualised within SDT, but as yet unaddressed in the gamification literature (Deterding, 2015; Nacke & Deterding, 2017; Mekler et al., 2017; Mitchell et al., 2017). When addressing factors external to the central and intrinsic human motivation to satisfy their psychological needs, a sub-theory of SDT, organismic integration theory (OIT), explores these factors from both an individual and contextual perspective as 'extrinsic motivation' (Deci & Ryan, 1985). Rather than viewing extrinsic motivation as a dichotomous opposite to extrinsic motivation, OIT categorises types of extrinsic motivation by how internalised they are to an individual and posits that the more internalised the motivation the greater impact it will have on positive psychological and behavioural outcomes (Deci & Ryan, 2002). Consequentially, to expand the scope of gamification research and address the overall research question, this thesis seeks to incorporate OIT research by answering the second sub-research question (RQ2) of this thesis:

To what extent does OIT explain consumers' use of gamification products?

By incorporating a focus on extrinsic motivation, this research not only seeks to address the limitations of previous research (see Nacke & Deterding, 2017), but also to address the moral questions this research has raised (Bogost, 2013; Kim & Werbach, 2016). Given that extrinsic motivation can undermine intrinsic motivation to the detriment of psychological outcomes even while impacting on behaviour (Mekler, Brühlmann, Opwis, & Tuch, 2013; Thom, Millen, & DiMicco, 2012; Callan et al., 2015), this suggests that gamification may be able to achieve behavioural impact at the expense of users' psychological health presenting significant ethical implications. Central to this is the observation that game mechanics may be considered fun in a voluntary video game setting, such as points and leaderboards and can be considered controlling in more restrictive settings such as the workplace (Kim & Werbach, 2016). This has raised the concern that, while unintended, gamification is some settings may actually amplify existing extrinsic pressures causing distress in users and provoking backlash from both users and regulatory bodies (Korn & Schmidt, 2015).

1.2 Research Aim

To summarise, this research seeks to build on the current understanding of the determinates of consumers' sustained use of gamification products, particularly within social marketing. To accomplish this, this research seeks to assess the capacity of Self-Determination Theory (SDT) and its sub-theory Organismic Integration Theory (OIT) to explain consumers' sustained use of gamification products. This theory driven approach to identifying and measuring the antecedents of gamification use will address the shortcomings of previous research that has focussed primarily on how individual game mechanics influence gamification outcomes and respond to the calls for a greater focus on motivational context in gamification research. This will provide insight into how gamification products can be better designed and implemented in social marketing interventions and identify and address the ethical issues that may arise from the use of this digital service.

1.3 Research Design

This section provides an overview and justification for the research context in Section 1.3.1. An outline of the research program that will be implemented to address the research questions follows in Section 1.3.2.

1.3.1 Research context

To address the ORQ of this thesis it is necessary to situate this research within behavioural domains that face the key challenge of social marketing contexts, their limited initial behavioural appeal (Bloom & Novelli, 1981; Hastings, 2007; Rothschild, 1999; Thøgersen, 2005). To this end this research will be situated within the contexts of physical exercise and workplace engagement. To reflect the way that gamification is typically implemented in social marketing contexts (Lister et al., 2014) and address calls for gamification research on motivation and other behavioural antecedents in naturalistic settings (Deterding, 2014; Seaborn and Fels, 2015), this research will investigate gamification through the use of mobile phone-based applications (apps).

The workplace context is one that has seen significant uptake of gamification services (Hamari et al., 2014) owning to the desire of managers and marketers to address the threats to employee engagement and retention brought about by changes in the 21st century workplace (Dobre, 2013; Ertürk & Vurgun, 2015). Not only does this context represent an excellent opportunity to study gamification within a motivationally complex environment as has been called for in the prior literature (Nacke & Deterding, 2017), it also presents an opportunity to address the mounting calls for research into the ethical consequences of using gamification in environments which restrict individuals' autonomy (Bogost, 2013; Kim & Werbach, 2016).

The physical activity context is of preeminent concern to the primary social marketing domain of public health (Gordon, 2011), owing to the significant positive health impacts of even moderate increases to physical activity (Norton, Norton, & Sadgrove, 2010). Increasingly, sedentary lifestyles and motivational difficulties in finding the time and energy to exercise have been blamed for rising rates of overweight and obesity (AIHW, 2018; Healy et al., 2008). This has led to social marketers prioritising addressing the challenge of

increasing physical activity (Lee & Kotler, 2019). This is also reflected in the growth of commercial tools to address this issue, with the market for user-directed fitness tools, including gamification, projected to be worth 14.7 billion by 2026 (Polaris, 2018). While this context has seen significant uptake of gamification products (Hamari et al., 2014), the drivers of success in this context are still poorly understood (Mitchell et al., 2017). Better understanding of what drives the sustained use of gamification in this context would thus address the ORQ.

1.3.2 Research program

A two-study, mixed-method research program will be implemented to answer the research questions as best reflects the post-positivist paradigm that informs the methodology of this thesis. Study One will use qualitative analysis of semi-structured interviews with users of gamified apps in the physical health context to establish their perspectives on the antecedents of their continued use of their gamification products. This will help to assess the degree to which SDT and OIT explain their relationship with gamification use, helping to address RQ1 and RQ2.

The insights gained by this first qualitative study will be used to construct a model of gamification motivation that will subsequently be verified and/or falsified by Study Two, which will qualitatively assess this model against survey responses from users of gamified apps in the workplace and physical activity contexts. In addition to evaluating the model constructed, and thus addressing RQ1 and RQ2, this study will also provide quantitative evidence of the relationships between extrinsic and intrinsic motivation in a gamification setting.

1.4 Contributions to Theory and Practice

The contributions of this research to Self-Determination Theory, as well as to social marketing and gamification literature are outlined in Section 1.4.1. Actionable insights into the use of gamification and related services in both social marketing and commercial marketing contexts are outlined in Section 1.4.2.

1.4.1 Theoretical implications of the research

A major limitation in the understanding of technology adoption, such as gamification products, in both social and commercial marketing contexts is the inadequate identification of factors that influence the determinates of technology adoption (Lai, 2017). This has limited the identification of environmental and contextual barriers to adoption in target audiences that may be initially hesitant to embrace new technology (Lee & Coughlin, 2015). Through the use of SDT and OIT, this research will help identify these external motivational factors to address this limitation and respond to the call for such research in both commercial (Gao & Bai, 2014; Oliveira, Thomas, Baptista, & Campos, 2016) and social marketing contexts (Immonen & Koivuniemi, 2018; Lee & Han, 2015). Using SDT to explore individual responses to external motivation can also highlight individual barriers to gamification use, which may allow for better segmentation strategies to be developed. Improving the use of theory in segmentation for technology adoption is pertinent especially to social marketers, where such barriers to behavioural adoption are more commonplace than in commercial marketing (French, 2017).

The focus of this research on the adoption of a tangible product reflects the shift in the social marketing literature away from the conceptualisation of 'product' in the marketing mix as the target behaviour itself and towards the operationalisation of this concept as tangible goods and services that supports behavioural change (Rothschild 2009; Smith 2009; Lee & Kotler, 2019). While the use of such supportive goods and services is now commonplace in social marketing research, there still exists a divide in how researchers discuss these features within their research (Edgar, Huhman, & Miller, 2017). This is problematic for research into the determinates of adoption and maintained use of supportive goods and services in social marketing, as this unclear definition of product diffuses the focus on this important element of the marketing mix (Thackeray, Fulkerson, & Neiger, 2012). Through the investigation of the determinates of gamifications use and maintenance, a tangible digital service that fits within Lee and Kotler's (2019) three-tiered conceptualisation of product as an 'actual product', this research will address the call for social marketing research to address the limited focus on this important element of the marketing mix (Edgar, Huhman, & Miller, 2017).

Given the importance of behavioural maintenance to social marketing outcomes, understanding the determinates of maintained behaviour change (rather than just initial adoption) is an area of major concern for social marketers (French, 2017). While existing research into the use of gamification products has shown that it is effective in supporting maintained behaviour change, the literature has had mixed success in identifying how it achieves this change or in identifying the determinates of its success or failure (Lewis, Swartz, & Lyons, 2016; Mitchell et al., 2017). Indeed, a major limitation of social marketing research more broadly has been a limited focus on theory driven exploration of the antecedences of behavioural maintenance (Rundle-Thiele et al., 2019). Through the application of SDT and associated sub-theories, this research will help to identify the relationships between a variety of individual and contextual factors and determinants of behavioural maintenance, such as intrinsic motivation, expanding the use of theory in this space and addressing the calls for greater research focus on behavioural maintenance (Rundle-Thiele et al., 2019).

This study also contributes to the gamification literature by adding to the assessment of the utility of SDT as a guiding theoretical lens in gamification research. Given the difficulties several researchers have faced in using this theory to explain gamification outcomes, the literature has called for expanding extant theory rather than continuing down existing pathways (Nacke & Deterding, 2017). Through a mixed-methods approach to data gathering, this study will be able to incorporate new insights and suggest further development of the use of SDT in gamification research. In particular, the incorporation of OIT into the analysis of data will help to address the call for gamification research to incorporate measures of contextual and individual factors to better identify possible determinates of gamification outcomes (Deterding, 2015; Nacke & Deterding, 2017 Mekler et al., 2017; Mitchell et al., 2017).

1.4.2 Practical implications of the research

A significant threat to the discipline of social marketing, is the increasing gap between social marketing practice and theory (Brennan et al., 2014; Spotswood, French, Tapp, & Stead, 2012). Across several social marketing domains, marketers either fail to ground their strategies in theory or default to familiar theories that lack contextual relevance (Manikam & Russell-Bennett, 2016). While this may reflect a lack of awareness of contemporary theories,

or time/resources to investigate new theories (Manikam & Russell-Bennett, 2016), it may also reflect the lack of consensus regarding theories pertaining to emerging technologies such as gamification (Nacke & Deterding, 2017). Arriving at a consensus around the determinates of gamification's outcomes is therefore not just of theoretical significance by also of practical significance.

Understanding these determinates could lead to better targeting of social marketing interventions. By incorporating insights from OIT, this research hopes to identify how contextual factors contribute to the adoption and maintained use of gamification products. Given documented cases of gamification's failure in some contexts such as education (Hanus & Fox, 2015), a better understanding of where and when gamification is likely to be impactful is important. SDT may also shed insight into the individual factors that contribute to gamification outcomes, allowing for better market segmentation to deliver this digital service to those most likely to benefit from its use (French, 2017). The identification of these determinates is an importance contribution, given that previous research into gamification has largely focused on specific mechanical components of this product and ignored contextual and individual factors that may be vital to understanding gamification outcomes (Nacke & Deterding, 2017).

The benefits of identifying these determinates would also extend to the development of better gamification products. By establishing how these factors influence gamification outcomes, social marketers can design products to compensate for or even overcome these limitations. Given that a major component of social marketing product strategies is the overcoming of behavioural barriers (Smith, 2009), the development of theory to inform this process would be well received. These findings are also expected to be broadly applicable to the use of digital services in contexts that have previously demonstrated limited response to such services.

Another implication of the use of SDT, and specifically OIT, within this research is its capacity to address the ethical issues that have been raised in response to the use of gamification in controlling environments such as the workplace. By identifying the impact that extrinsic motivation has on the use of gamification as well as psychological outcomes such as intrinsic motivation, this research will seek to address concern that some researchers have raised

regarding the capacity for gamification to achieve behavioural outcomes at the expense of the psychological wellbeing of users (Kim & Werbach, 2016). This will address the call by researchers such as Hanus and Fox (2015) to explore in greater detail the potential for negative consequences of gamification, which poses practical challenges to marketers in the form of regulatory and user backlash (Korn & Schmidt, 2015).

1.5 Structure of the Thesis

This thesis consists of five additional chapters and an outline of these chapters is provided below. The studies that comprise the research program potion of this thesis are presented in journal article format as Chapter 4 and Chapter 5. This format was selected as they allow for the methodology employed to obtain the results and the implications and limitations of those results to be discussed in close proximity.

Chapter 2: Literature Review delineates the extant literature across the social marketing, gamification and context specific fields of the study to better inform the overall research question. This review is conducted critically, to identify gaps in the literature and inform the development of the research questions designed to address these gaps.

Chapter 3: Justification of the Research Context and Design provides arguments supporting the selection of the contexts within which the research is situated. These arguments are then used to justify the design of a research program developed to address the research questions of this study, comprised of a two-study mixed-methods approach. This includes delineation and justification for the specific data collection, sampling and analysis methods employed by each study. Specific information on how the data is collected and analysed in each study is not included in this chapter however, rather this is presented in journal style in the following two chapters.

Chapter 4: Consumers' perceptions of gamification services details the implementation and results of a qualitative semi-structured interview study developed to mature understanding of the determinates of continued use of gamification services, presented in journal article format. This chapter begins with an introduction and context specific literature review to justify the methods it will then outline. This chapter then provides the results of this study, and an analysis of the implications and limitations of these results.

Chapter 5: Two Studies of Motivation in Health and Workplace Gamification presents the results of a quantitative online survey conducted on users of gamification products in the physical activity and workplace contexts. This study is designed to test a model of gamification use outcomes designed from analysis of the findings of study one and is presented in journal article format. As with study one, this chapter contains an introduction and literature review which justifies the methodology of this study as well as the specific hypothesis to be tested. This methodology is then outlined, followed by the results of this method. These results are then analysed for implications and limitations.

Chapter 6: Discussion and Conclusion concludes this thesis by demonstrating how each research question outlined in Chapter 2 was addressed and the implication of these findings. This is done through drawing on the findings of both Chapter 4 and Chapter 5 to develop overall theoretical and practical contributions. This chapter also addresses the limitations of this thesis's research design and presents opportunities for future research to expand upon these findings.

1.6 Conclusion

This chapter provided an overview of the intent and structure of this thesis. Initially, it outlined the research questions and aims, with a brief justification of their importance. It then provided an overview and justification of the research context selected for research, and then an overview of the specific research program developed to address the stated research questions. This was followed by a discussion of the theoretical and practical contribution this research program was capable of making. This chapter concluded with an overview of the structure of the thesis.

Chapter 2: Literature Review

This chapter provides a review of the literature relevant to the aims of this thesis as outlined in Chapter 1. This begins with Section 2.1, which examines the definition of social marketing and its similarities to, and deviations from, commercial marketing. This is provided as a way to explicitly state the position this thesis takes regarding the goals and methods of social marketing, as this perspective will inform much of the rest of this literature review. The following Section 2.2 highlights the range of differences in how the product component of the social marketer's marketing mix has been conceptualised in previous research and discusses the negative impact this has had on understanding the determinates of successful product strategies. This includes discussion of the increasingly utilised digital and technology-based product category, and the need for better understanding of how to develop and implement these products into social marketing. Section 2.3 then introduces the emerging technology-based product of gamification. This includes its definition and comparison with conceptually similar products such as serious games. It also incorporates a review of literature pertaining to its use in social marketing contexts and proof of its efficacy in stimulating maintained behaviour change. This is followed by Section 2.4, which delineates an evaluation of the current understanding of how gamification achieves behavioural impact, highlighting a number of gaps in the extant literature. Self-Determination Theory, which has emerged as a dominate theory within gamification research, is critically analysed alongside research which has drawn on this theory to explain gamification outcomes. This section emphasises the importance of moving beyond the narrow focus on game features typified by extant literature, and towards a better understanding of how the contexts being gamified influence gamification outcomes. Last, a summary of the research gaps identified by this literature review is presented in Section 2.5, followed by the research questions developed by this thesis to address these gaps.

2.1 Social Marketing

2.1.1 The definition of social marketing

Marketing is more than just the process of selling a product, as reflected in the American Marketing Association's (AMA) 2017 definition of marketing as:

"*the activity, set of institutions, and processes for creating, communicating, delivering, and exchanging offerings that have value for customers, clients, partners, and society at large*."

This definition highlights the broad array of offerings that marketing can engage with, but importantly also highlights the wide range of recipients of marketing services in the modern world and raises the possibility of marketing for non-commercial objectives.

Non-commercial marketing is not a new idea, with governments in particular having a long history of use of marketing tools such as promotions and advertising to inform and persuade its citizens (Wilkie & Moore, 2003). However, the creation of what would become known as 'Social Marketing' as a formal area of study distinct from commercial marketing is largely attributed to Wiebe's (1951) question: "*Why can't you sell brotherhood ... like you can sell soap?*" (p. 679). This argument was further articulated by Kotler and Levy (1969) who made the case that marketing was more than a tool for selling products but could be used to sell ideas, suggesting that marketing therefore had non-commercial uses to society and government. Kotler and Zaltman followed up with this concept, formally coined the term 'social marketing' in 1971 and defined its practice as "*the design, implementation, and control of programs calculated to influence the acceptability of social ideas and involving considerations of product planning, pricing, communication, distribution, and marketing research*" (Kotler & Zaltman, 1971, p.8).

However even from social marketing's earliest beginnings, there was vigorous debate about the nature and scope of the domain (French, 2012). A major point of contention was the identification of the objective of social marketing as being the acceptability of social ideas (Rangun & Karim, 1991), with this broad objective leading to conceptual overlap with academically competing fields such as health promotion and education strategies (Andreasen, 1994). While definitions in social marketing would remain contentious, as research in this field grew a consensus emerged that the ultimate goal of social marketing was, as with commercial marketing, the influence of behaviour (Andreasen, 2002, 2003).

Reflecting this, most modern definitions of social marketing focus on behaviour change, with the most recent meeting of the International Social Marketing Association (ISMA, 2016) resulting in the following consensus definition: “Social marketing seeks to develop and integrate marketing concepts with other approaches to influence behaviours that benefit individuals and communities for the greater social good”. This definition reflects the necessary focus of social marketing on behaviour, as well as highlighting that social marketing can draw on approaches outside of traditional marketing concepts, and thus is the social marketing definition adopted by this study.

2.1.2 Social marketing is derived from commercial marketing

In any voluntary behavioural context, an individual will weigh what they perceive as the costs and benefits of their behavioural options to determine the action that will provide them with the greatest self-benefit (Bagozzi, 1975). In a commercial marketing context this principle underpins the fundamental concept of exchange in which a transfer of value takes place between two or more actors, with the implication that the exchange will be mutually beneficial as each party will only enter into exchange when the perceived value of the exchange is greater than its costs (Bagozzi, 1979). Commercial marketing practice is therefore focused on the creation and communication of the benefits of the goods and services being sold, as well as the delivery and facilitation of exchanges (AMA, 2017).

In pursuit of social benefits, social marketing adopts many of the core theory and concepts of commercial marketing, particularly the principles of exchange with this concept often considered the defining element of social marketing (French & Russell-Bennett, 2015). Education may increase awareness of the benefits of positive behaviour (or the costs of negative ones) and law might be able to result in involuntary behaviour change through enforcements, but it has been proposed that via exchange and an appreciation of the self-interest of the target audience, social marketing can inform a wider range of interventions in the difficult voluntary behaviour change domain (Rothschild, 1999). These interventions draw upon commercial marketing theories, principles and frameworks (Dann, 2010), particularly the marketing mix (product, price, place and promotion) which has become foundational to social marketing research and practice (Luca & Suggs, 2010; Thackeray & McCormack Brown, 2010). The traditional social marketing approach therefore seeks to develop a social marketing program that tailors price, product, promotion and place

offerings to the needs of an identified target audience of consumers to deliver a positive behavioural exchange (Kotler & Roberto, 1989).

2.1.3 Social marketing is distinct from commercial marketing

However, as social marketing research has matured and the range of approaches it draws upon widened, several important distinctions have emerged that challenge traditional understandings of how marketing concepts apply to social marketing contexts (Wood, 2012; Tapp & Spotswood, 2013). The root of many of these distinctions between social and commercial marketing arise from the difference in contexts in which social marketing takes place. In the pursuit of 'social good', it is common for social marketeers to operate in behavioural domains such as health promotion, injury prevention, environmental protection and community mobilisation (volunteering) (Lee & Kotler, 2019).

Common issues faced by social marketers in these contexts, comparative to behaviours targeted in commercial marketing, is that the behaviours targeted by their programs are significantly more complex and difficult to perform (Bloom & Novelli, 1981) and deliver less initially obvious benefits to the behavioural consumer (Rothschild, 1999). In particular, they commonly require the behaviour to be maintained for a period of time before receiving any tangible benefit (Hastings, 2007) and the benefits themselves are often poorly understood (Rothschild, 1999). This has the effect of undermining the relationship between action and outcomes, reducing the motivation to perform the behaviour (Thøgersen, 2005). Despite the importance of behavioural maintenance to social marketing, however, there is limited extant understanding of the factors that contribute to maintenance with most social marketing research focusing on the determinates of initial adoption of behaviour (Andreasen, 2003, 2004; Rundle-Thiele et al., 2019). For this reason, social marketers commonly draw on marketing theory and programs to address the initial lack of motivation to perform the behaviours they target (Dibb & Carrigan, 2013; Hastings, 2003, 2007).

This is further complicated by the focus of social marketing on voluntary exchange-based behaviour change, as this brings the behaviours that social marketers are trying to encourage into 'competition' with other, non-socially positive behaviours (Hastings, 2007; Noble & Basil, 2012; Schuster 2015). Considering the lack of initial appeal of many behaviours targeted by social marketers, competing behaviours (including inaction) will

often be seen as more attractive choices (Hastings, 2003). Even if initial behaviour change has been achieved by a social marketer, the threat of competing behaviours remains. As the costs of behavioural maintenance become salient, or the behavioural consumer becomes disillusioned with the benefits they have received, they may switch to easier, more instantly gratifying behaviours (Hastings, 2007). Given that behavioural maintenance is important to many social marketing campaigns, this magnifies the threat of competition (Hastings, 2007). In addition to competing behaviours, social marketers face competition in the form of purposeful competition from competing firms and identifiable entities (such as fast food companies in a healthy eating context), inertial resistance (tendency to continue existing behaviours and resist new ones) or any alternative messaging from organisations and individuals inconsistent with the desired behaviour (Hastings, 2003; Lee & Kotler, 2019).

For this reason, social marketeers often seek to communicate and create value while reducing behavioural costs to ensure that their target behaviour can out compete alternative offerings which results in their audience voluntarily changing behaviour, and maintaining this behaviour change (Lee & Kotler, 2019). Employing marketing principles, social marketers have successfully created this positive exchange for their audience of consumers and delivered behaviour change across wide variety of contexts (Lee & Kotler, 2019; Stead, Gordon, Angus, & McDermott, 2007). However, a distinct problem in social marketing is that situations can arise in which the base behavioural exchange on offer is never appealing to the consumer, regardless of how it is presented, such as convincing a binge drinker to quit drinking when this negative behaviour meets perceived needs (of entertainment, distraction, and community) better than their limited available alternatives (Spotswood & Tapp, 2011). While even in commercial marketing differences in how individuals perceive the costs and benefits (and resulting value) of a particular exchange form a key barrier that must be overcome through marketing campaigns (Sánchez-Fernández & Iniesta-Bonillo, 2007), this is particularly pronounced in social marketing and has led some researchers to propose an expansion in the scope of social marketing beyond the traditional 4 P's marketing mix and into other behaviour change paradigms (French & Russell-Bennett, 2015; Spotswood, French, Tapp, & Stead, 2012; Gordon, 2011).

In conclusion, while social marketing is derived from commercial marketing theory and practice (Lee & Kotler, 2019) differences in social marketing's objectives and the contexts in

which it operates have led to several important distinctions between social and commercial marketing (French & Russell-Bennett, 2015: Rothschild, 1999; Tapp & Spotswood, 2013; Wood, 2012). These differences, and the difficulties that traditional marketing theory has had in addressing the problems they raise, has led to the call from several researchers to critically examine extant theory (French & Russell-Bennett, 2015; Spotswood et al., 2012). In particular, it has been identified that social marketing research must focus on re-evaluating the marketing mix (Gordon, 2011; Tapp and Spotswood, 2013) and developing a deeper theoretical understanding of the determinates of maintained behaviour change (Rundle-Thiele et al., 2019).

2.2 Products in the Social Marketing Mix

One common criticism of extant social marketing theory that underpins many of the aforementioned calls for theory extension, is the limitations imposed by the current conceptualisations of the marketing mix within social marketing programs (Gordon, 2011). While a range of criticisms have been levelled at the use of the traditional 4P's paradigm that dominates social marketing theory (see French & Russell-Bennett, 2015 for a good overview), this thesis will focus on issues arising from the conceptualisation of 'product' within the social marketers' marketing mix.

Social marketing typically has objectives rooted in 'socially beneficial' behaviour change, rather than the sale of goods and services for commercial objectives as in commercial marketing (Lee & Kotler, 2019). This difference in focus has had implications for how social marketers conceptualise and implement the marketing mix (Lee & Kotler, 2019). In commercial marketing the product component of the marketing mix traditionally refers to the goods and services offering of the firm, however for social marketers, it can also include the features of the behavioural offering itself to enable conceptualisation of marketing campaigns with no good or services-based offering (Andreasen, 2004; Gordon, 2011). For example, rather than 'selling' gym memberships or seat belts, social marketers are selling the health benefits of exercise or the safety benefits of wearing a seatbelt (Brown, 2006). This conceptualisation of product reflects the absolute importance of behaviour to social marketing and has become the dominate school of thought in social marketing (Lefebvre, 2011).

Rothschild (2009), however, argues that this conceptualisation results in the impractical merging of the desired dependent variable of behaviour change with the independent variables of the marketing mix. While considerable behavioural impact can be derived from altering the perception of benefits derived from a behaviour (Andreasen, 2004; Bloom & Novelli, 1981), these campaigns more reflect an education or communications approach and miss out on the many benefits possible under an integrated marketing approach (Tapp & Spotswood, 2013). Further, without fundamentally changing or providing goods or services that support the behaviour being targeted, it may be impossible to change consumer perceptions regarding the unfavourable exchange offered by the base behaviour (Rothschild, 2009).

On this basis, the authors of the popular text book “Social Marketing”, Lee & Kotler (2019), have promoted a three tiered conceptualisation of product drawing from Kotler’s (1967) earlier work in developing definitions of product in commercial marketing. Under this definition, product is considered as core product (benefits of the behaviour), actual product (tangible goods or services supporting the behaviour), and augmented product (non-physical components of the actual product) (Lee & Kotler, 2019). An example of these three tiers would be the health and financial benefits of smoking cessation (core), nicotine patches and gum to help quit (actual) and support services and phone quit-lines (augmented). Other examples of social marketing ‘actual products’ that fit this definition would include bed nets for malaria control, condoms for HIV prevention or rehydration products for diarrheal diseases (Lefebvre, 2011). While this three tiered conceptualisation has become commonly accepted in social marketing (Wood, 2008) the focus on ‘core products’ in many studies has been at the expense of investigating supporting ‘actual products’ which has resulted in limited understanding of the determinates of their success (Edgar, Huhman, & Miller, 2017; Thackeray, Fulkerson, & Neiger, 2012).

Yet the role of actual goods and services to support or enable behaviour change in social marketing should not be overlooked (Smith, 2009). The behavioural effect of a good or service that incentivises a target behaviour over its competition through the creation of positive exchange for the consumer is a powerful means for social marketers to overcome the initial 'unattractiveness' of their offering via the creation of value and utility or the reduction in costs and barriers (Rothschild, 2009; Smith, 2009). There are many examples of

social marketeers using a good or service product offering to facilitate behaviour change across a wide range of contexts (Grier & Bryant, 2005). An oft-cited exemplar of this type of product approach is the reduction of alcohol-related road incidents in Wisconsin through the offering of a limousine ride home (Grier & Bryant, 2005; Rothschild, Mastin, & Miller, 2006).

Where there are several benefits to the incorporation of actual products in the social marketers marketing mix, they also come with some significant limitations. As previously highlighted, the interchangeability of core and actual products when discussing the product component of the marketing mix in extant research has limited the understanding of determinates of product strategy success (Edgar, Huhman, & Miller, 2017; Thackeray, Fulkerson, & Neiger, 2012). This is coupled with larger costs associated with incorporating actual product support into social marketing programs, increasing the risk of failure and disincentivising their use (Akter & Ray, 2011; Bloom & Novelli, 1981; Lefebvre, 2009; Whittaker, 2012). To reduce this risk and increase the accessibility of actual products, social marketers are now exploring cheaper methods for incorporating actual products into their marketing mix which has resulted in the recent trend towards digital and technology based social marketing interventions (Akter & Ray, 2011; Russell-Bennett et al., 2016, Whittaker, 2012).

2.2.1 Digital and technological products in social marketing

This drive for technology-based products or interventions reflects the growth in technology uptake amongst consumers, particularly the growth in the use of mobile phones which have shown stabilised uptake and use across all age groups, reflecting a broad shift toward mobile technology across the developed world (Anderson, 2019). Since the early 2000's the majority of adults have had access to and regular use of mobile technology (Horrigan, 2008), and the continued growth of the technology marketing has resulted in the consensus that most populations targeted by social marketing now have the proficiency and equipment to partake in technological interventions (Lefebvre, 2009). They also have excellent conceptual fit with the voluntary domains of social marketing, as these digital products are most commonly user controlled and thus help empower change on an individual level (Whittaker, 2012).

A major reason for the uptake in digital and technological products in social marketing campaigns is their cost efficacy in reaching large numbers of consumers (Lefebvre, 2009). They are also much easier to scale up to state, national or even international scopes following successes (Akter & Ray, 2011), granting operational flexibility that is often lacking in actual product focused social marketing interventions (Lee & Kotler, 2019). Given the budgetary limitations that are often imposed on social marketers (Bloom & Novelli, 1981; French, 2010), these features of digital and technological products represent tremendous opportunity to this domain (Lefebvre, 2009). The use of mobile technology in particular represents a tremendous opportunity to utilize consumers' pre-existing positive relationships with their mobile devices to build positive behavioural exchange and persuasive power (Fogg, 2007; Whittaker, 2012). Examples of successful technology-based product offerings include the use of mobile health breastfeeding support (Gallegos, Russell-Bennett, & Previte, 2011), the use of mobile mental health services (Schuster, Drennan, & Lings, 2013) and monitoring and self-management of diabetes (Sieverdes, Treiber, Jenkins, & Hermayer, 2013).

Social marketing research, however, highlights that attrition in these technology-based interventions is substantial when compared to more face to face and physical measures and trials (Patrick et al., 2016; Eysenbach, 2005). For instance, while continued subscription to an online weight loss program remained high in the medium term (12 weeks) at 72%, after 52 weeks it had dropped to 28%. Further, even by 12 weeks, only 35% of participants showed high enough levels of engagement with the product to be classified as users (Neve, Collins, & Morgan, 2010). Similarly, the free mobile health service 10,000 steps reported a 50% attrition rate after 30 days, with low levels of engagement in the logging of behaviour through the service associated with cessation (Guertler et al., 2015). These attrition rates would actually be considered quite low, with an online panic disorder self-help program reporting a 1% completion rate (Farvolden, Denisoff, Selby, Bagby, & Rudy, 2005) and an online cognitive behaviour depression intervention reporting a 0.5% - 22.5% completion rate (Christensen, Griffiths, & Jorm, 2004). In their review of attrition in digital services, Eysenbach (2005) suggests that a key reason for this is a lack of a clear link to participants' well-being and benefit, combined with the ease of discontinuing technological service use. This suggests the positive relationship most consumers have with technology (Fogg, 2007)

alone is not sufficient to ensure that the behavioural exchange is positive for consumers of technology-based behaviour change programs (Hastings, 2003; Lee & Kotler, 2019).

Engaging users with technology interventions is further complicated by the aforementioned lack of research focus in social marketing into the determinates of actual product success (Edgar, Huhman, & Miller, 2017; Thackeray, Fulkerson, & Neiger, 2012) as well as the focus in extant research on behavioural adoption rather than maintenance (Rundle-Thiele et al., 2019). The research that has been conducted into the determinates of digital and technological product success in both commercial (ie: Wessels & Drennan, 2010; Jeong & Yoon, 2013) and social marketing contexts (ie: Mulcahy, Russell-Bennett, & Rundle-Thiele, 2015) have largely focused on users perceptions about particular properties of the products, particularly utility. This has led many social marketers to explore theory and practice derived from existing digital contexts to better inform the development of products capable of meeting these perceptions (Blair, 2017; Manikam & Russell-Bennett, 2016) including novel domains such as video gameplay (Mitchell et al., 2017; Mulcahy et al., 2015).

2.3 Gamification: Behaviour Change Through Gameplay

2.3.1 The definition of gamification

Drawing on gameplay principles in the design of social marketing products is in many respects an attempt to integrate the demonstrated behavioural pull of playful experiences into these products (Hamari, Koivisto & Sarsa, 2014). Playful experiences, or leisure activities taken freely for no material interest, have been considered both the central activity of flourishing cultures but also distinct and separate from “ordinary” or “real” life (Huizinga & Hull, 1949, pp. 8-9). Much has been said about the incidental benefits of playful experiences, from early discussions of moral lessons imparted by classical games such as Chess (Franklin, 1779) to the adaptive functions of play in mental and social development (Bjorklund & Pellegrini, 2010). However, the premise that play is distinct from “real” life was challenged by developmental psychologists such as Piaget (1962, p.147), who observed that through the assimilation of the characteristics of play, non-playful experiences can become playful and therefore capable of having meaning or purpose in and of themselves, rather than deriving such purpose externally.

Arising from this concept of the assimilation of playful characteristics, is gamification, or "*the use of game design elements in non-game contexts*" (Deterding et al., 2011a, p. 1). Gamification seeks to enrich non-game behaviour with game design mechanics, such as scoring systems, with the intent to make the target behaviour more fun or engaging (Deterding et al., 2011a). As an example of a commercial gamification product within a social marketing context is the mobile application 'Pokémon Go' by Niantic (2016). This mobile phone app encourages physical activity through the creation of a narrative in which the user is a collector and trainer of virtual creatures known as Pokémon. Using tracking data from the user's phone, as well as augmented reality features via their phone's camera, the app allows users to catch Pokémon only when they are present in specific physical locations which necessitates their physical movement through the real world. Players also receive rewards for traveling between '*Pokéstops*' and '*Gyms*', again incentivising physical movement between landmarks in the real world. While this product was designed with commercial objectives in mind, rather than social marketing behavioural objectives, the success this app has had in incentivising physical behaviour through game mechanics highlights the potential of this technology for social marketers (Althoff, White, & Horvitz, 2016; Clark & Clark, 2016).

There are numerous other successful applications of gamification in social marketing domains such as in energy conservation (Gustafsson et al., 2009; Russell-Bennett et al., 2016) and health (Hamari & Koivisto, 2013). Gamification has a particular appeal to social marketers looking to create digital products to support their programs, as the positive experience of gameplay and the impact of virtual rewards may be effective at creating value for users and compensating for the limited initial attractiveness of the underlying behaviour (Mulcahy, Russell-Bennett, & Rundle-Thiele, 2015).

While the game mechanics utilised in gamification to create these playful experiences can be adopted from any number of game contexts, the design philosophy of gamification typically draws from research and practice in the commercial video games industry, reflecting the increased sophistication and mainstream acceptance of this hobby (Olson, 2010; Ryan, Rigby, & Przybylski, 2006). Australia in particular has seen remarkable expansion in the prevalence of video games for entertainment, driven largely by the uptake of mobile games by consumers who would not otherwise consider themselves to be 'gamers' (IGEA, 2019). The average time spent in gameplay has risen to 89 minutes a day, with 67% of Australians

now playing video games in some form or another (Brand, Todhunter, & Jervis, 2017). The demographics of gamers have also changed to better reflect the broadening appeal of the hobby, with 47% of gamers now female and the average age increased to 34 (Brand, Todhunter, & Jervis, 2017). As the demonstrated attraction for video games becomes more apparent, it is little wonder that researchers have begun investigating the motivational appeal of this pastime and whether this appeal can be transferred to other behaviours (Hamari, Koivisto & Sarsa, 2014; Olson, 2010; Ryan, Rigby, & Przybylski, 2006).

As research into gamification matured, the definitions of gamification began to adopt terminology grounded in the theories that were being adopted by researchers. This is reflected in the definition adopted by this thesis of gamification as "*a process of enhancing a service with affordances for gameful experiences in order to support user's overall value creation*" (Huotari & Hamari, 2012, p. 19). Key to this definition is the concept of motivational affordance, a term borrowed from information systems research and defined as "*the actionable properties between the world and an actor*" (Gibson, 1979, as referenced by Norman, 1999, p. 39). Such actionable properties constitute the features of an object that determine whether and how it can support motivational, behavioural pull (Elliot & Covington, 2001; Zhang, 2008). In gamification research, game design mechanics, such as points leaderboards and badges, can be considered sources of motivational affordance (Deterding et al., 2011b, May) that enrich the target behaviour to stimulate continued user engagement (Deterding, 2011, May; Hamari et al., 2014; Zhang, 2008).

The term 'gamification' has at times been used interchangeably with the term 'serious games'. Gamification is conceptually similar to this emerging field of serious games, or "*games to educate, train and inform*" (Michael & Chen, 2005), in that both seek to use the motivational appeal of immersive gameful play to change behaviour (Hamari et al., 2014; Olson, 2010; Ryan, Rigby, & Przybylski, 2006). However, there are some key differences. A serious game is a fully-fledged game that has been designed to achieve a goal beyond that of entertainment or commercial gain such as education or training (Michael & Chen, 2005; Egenfeldt-Nielsen, 2008). Gamification, alternatively, is the attachment of game design mechanics to a target behaviour in an attempt to increase behavioural motivation through engagement and enhanced user experience (Deterding et al., 2011b, May; Huotari, & Hamari, 2012). Consequently, by comparison, a serious game is a fully realised game built

according to game design principles but with a 'serious' intention, whereas gamification uses game design mechanics to imbue the behaviour with game qualities, directly incentivising the target behaviour (Muntean, 2011).

2.3.2 Gamification products and efficacy

Gamification has been operationalised within contexts ranging from education, health and community mobilisation, through to personal finance and productivity (Hamari, Koivisto, & Sarsa, 2014). Commercially it has perhaps seen the most success within the domain of personal health and fitness, reflecting the explosive growth of this industry within the mobile app marketplace (App Annie, 2019; Lister et al., 2014) with projections that the fitness app market will reach 14.7 billion by 2026 (Polaris Research, 2018). The commercial success of gamification products within this category such as Six to Start's "Zombies, Run!" (the highest-grossing Health & Fitness app on Apple's App Store within weeks of release, Southerton, 2013) and Niantics "Pokemon Go!" (Broke sales records in its opening month, as well as demonstrating good loyalty in players long term, Kawa & Katz, 2016; Petite, 2017) indicate the appeal of this approach to consumers who are increasingly looking to digital tools to help support their own voluntary behaviour change (Lister et al., 2014).

Another area where gamification has seen commercial success is in the gamification of workplaces where examples of this technology include a leaderboard system to increase participation in IBM's internal social networking service (Thom, Millen, & DiMicco, 2012), and points based rewards to improve the design of relevance assessments in an information retrieval system (Eickhoff, Harris, de Vries, & Srinivasan, 2012). The gamification of productivity and workforce engagement has become a major growth industry with companies of all sizes turning to gamification to incentivise reporting and compliance, professional and personal development and workplace productivity (Dale, 2014; Ferreira et al., 2017). This industry typically represents a different approach to the commercialisation of gamification, where the product is paid for by organisations looking to change the end user's behaviour rather than paid for by a voluntary end user (Ferreira et al., 2017).

Beyond the commercial applications of gamification, this technology has also seen uptake across social marketing domains by a variety of non-commercial agents such as governments and advocacy groups (Freudmann & Bakamitsos, 2014; Ramadan, 2018; R, 2013). While this

is often undertaken because of the preference consumers show for gamification services (Dietrich et al., 2017), these non-commercial agents are also often interested in the specificity, immediacy and behavioural impact of the digital feedback provided by game mechanics to reward or punish targeted behaviour (Ramadan, 2018; King et al., 2013). Indeed, the controversial Chinese social credit system, the point-based reward and punishment system that encourages citizens to behave in line with government expectations, can be considered a nationwide gamification system, making it the largest and most comprehensive gamification system yet devised (Ramadan, 2018).

These examples highlight the potential for gamification principles to be applied to almost any context imaginable and as use of this technology grows, gamification has attracted the attention of researchers across a variety of academic contexts (Dey & Eden, 2016; Hamari, Koivisto & Sarsa, 2014; Nacke & Deterding, 2017). As an emerging research context, much of the formative research in this domain focused on questions of efficacy, asking primarily if and in which contexts gamification worked (Dey & Eden, 2016; Nacke & Deterding, 2017).

A turning point in the maturation of gamification research was a literature review by Hamari, Koivisto and Sarsa (2014) that provided evidence that gamification programs matched to their target audience and behavioural context can achieve behavioural change. In this review Hamari, Koivisto and Sarsa employed a modified concept matrix to analyse the outcomes of twenty-four gamification studies across several contexts. They found that in the large majority of studies, gamification was able to achieve positive results (predominantly behavioural change or behavioural intention change) for most of the outcomes studied, with no study they reviewed producing entirely non-significant results. Examples of studies they analysed include Gustafsson, Katzeff and Bang's (2009) study into the use of a gamified energy saving app in encouraging reductions in household energy use. They found that use of the gamification program across six energy saving 'missions' resulted in an average reduction of between 15.7% kWh and 28.8% kWh between the two teams. Successful gamification outcomes were also achieved in a range of other contexts, including exercise (Hamari & Koivisto, 2013), encouraging innovation (Jung, Schneider, & Valacich, 2010), and incentivising data gathering (Downes-Le Guin, Baker, Mechling, & Ruylea, 2012). More recent research in social marketing contexts has continued to highlight the capacity of gamification to achieve positive behavioural results, with

positive outcomes in encouraging healthy drinking behaviours (Mulcahy et al., 2015), reducing energy consumption (Russell-Bennett et al., 2016) and increasing physical activity (Mitchell et al., 2017).

However, Hamari, Koivisto and Sarsa's (2014) meta-analysis also showed that not all measured outcomes were positive. Halan, Rossen, Cendan, and Lok (2010) investigated the ability of a gamified program's ability to motivate medical students to help create their own educational materials. In this study, leaderboards, narrative and deadlines were used to encourage students to produce virtual human interactions that would serve as training products for other students. The use of these virtual rewards resulted in increased quantity of virtual interactions produced, however, the desire to maximise scores resulted in contributions less reflective of real-world conversations. The authors therefore highlighted the importance of aligning scoring mechanisms with behavioural goals. Several other studies in the Hamari, Koivisto and Sarsa (2014) review reported similar mixed results. Farzan et al., (2008) reported that the initial increases in user activity following the introduction of gameplay mechanics to a company's internal social networking system quickly diminished over time. Frazan and Brusilovsky (2011) reported that the increase in user participation in their gamified course recommendation system had the unexpected impact of increasing positive rating bias. Hamari, Koivisto and Sarsa (2014) thus argued that these mixed results highlighted a lack of understanding as to how gamification worked on a fundamental level. A major finding of this review then was the identification of key weaknesses in extant literature that prevented this understanding from developing, such as small samples sizes, an over-reliance on qualitative data, and limited use of pre-validated psychometric measurements. Crucially no studies of the time employed a theory driven multi-level measurement methodology capable of capturing the impact of gamification affordances on both behavioural outcomes and antecedents such as motivation. Hamari, Koivisto and Sarsa (2014) categorised these issues as symptoms of the limited use of theory in the design and analysis of gamification research, and thus greater use of theory and the identification of the determinates of gamification outcomes have become the key elements of the next wave of gamification research (Nacke & Deterding, 2017).

While more recent research has come some way in the identification of specific determinates and the exploration of a range of theoretical lenses through which gamification can be understood (Deterding, 2014; Lewis, Swartz, & Lyons, 2016; Mekler et al., 2017; Seaborn & Fels, 2015), a consensus on exactly how gamification works is yet to be reached (Nacke & Deterding, 2017). And yet addressing this gap is of vital importance to social marketers, owing to its role as an evidence-based approach to behaviour change (Evans, 2006; Lefebvre, 2011). Without a clear understanding of the theoretical determinates of behaviour change, it is difficult to predict outcomes or better design and implement programs for long term behavioural impacts (Dibb & Carrigan, 2013; Hastings, 2007; Rothschild, 1999). Thus, despite the consensus that gamification can be an effective behaviour change strategy (Hamari, Koivisto, & Sarsa, 2014), it has become clear that more research is needed to understand the factors that underpin consumers' behavioural responses to gamification (Nacke & Deterding, 2017).

In summary, while prior research has highlighted the utility of gamification as a behaviour change tool it has also raised questions regarding the factors that contribute to gamification application use and maintenance (Hamari, Koivisto & Sarsa, 2014; Nacke & Deterding, 2017). Because of this, gamification research must expand to include questions of how gamification achieves behavioural outcomes, especially over time, and what factors influence this relationship (Mekler et al., 2017; Seaborn & Fels, 2015). Specifically, extant gamification research has had limited ability to empirically support any conceptual or theoretical framework proposed to explain the behavioural outcomes commonly observed in gamification studies (Dey & Eden, 2016; Antin & Churchill, 2011; Deterding, 2014; Nacke & Deterding, 2017). Owing to this limitation, the literature has called for an expansion of gamification research beyond the purely behavioural and de-contextualised focus of its past, and towards an understanding of the motivational experience of the end user (Deterding, 2014; Nacke & Deterding, 2017; Mekler et al., 2017; Seaborn & Fels, 2015).

The following section explores the various theories that have been explored in extant literature and discusses the emergence of Self-Determination Theory as the most commonly applied theoretical lens in gamification research (Nacke & Deterding, 2017).

2.4 Evaluation of Current Understanding of Consumers' Behavioural Responses toward Gamification-Based Service Products

In describing gamification, early studies drew from the human-computer interaction conceptualisation of motivational affordance (Norman, 1999). These studies focused on the behavioural effects of gamified systems in order to develop the definitions and taxonomy of this research context (Seaborn & Fels, 2015). Focusing the early research in this way was an important step in the development of this context (Harman, Koohang, & Paliszkiewicz, 2014), but as gamification research has matured it has attempted to develop a better understanding of 'how' gamification achieves outcomes, rather than just 'if', via the expansion of theory (Nacke & Deterding, 2017).

The initial research that focused on identifying the determinates of gamification outcomes centred primarily on building upon research from the video game domain (Deterding et al., 2011b). Thus, some researchers have expressed the view that, as with the motivational pull of video games, gamification appeals to consumers as it can produce a feeling of flow (Hamari & Koivisto, 2014; Sailer, et al., 2014; Sillaots, 2014). Flow is a concept in positive psychology popularised by Czikszentmihalyi (1990) in his book of the same name, in which an individual is totally absorbed in a particular task resulting in feelings of focus, engagement and enjoyment. It is particularly relevant to gamification research given the demonstrated capacity for video games to bring about flow states (Procci et al., 2012; Wang et al., 2009), and its ability to predict outcomes in this setting when combined with other theories such as the technology acceptance model (Hsu & Lu, 2004). However, a limitation of the use of this theory in gamification research is that flow in a gamification setting is dependent on the presence of intrinsic motivation (the desire to undertake an activity for its own sake, rather than external reward), whereas flow theory typically maintains that intrinsic motivation is an outcome of flow rather than a condition of it (Hamari & Koivisto, 2013). To put this another way, flow in a gamification setting requires the gamification product to be fun or interesting, and thus designing for 'flow' is not possible without first understanding how to design for intrinsic motivation. Hamari and Koivisto (2013) suggested that this may be due to many of the features of a full game experience being missing within a gamification product (as these products use mechanics of games, rather than being games themselves) and thus the conditions and outcomes of flow are less correlated than in video

game settings. This indicates that while flow can be a useful theory to inform the development of better gamification products that strike a balance between the demands of the task and the abilities of the performer (Nakamura & Csikszentmihalyi, 2014), it is not sufficient to explain how to generate the intrinsic motivation appeal that it is dependent upon (Hamari & Koivisto, 2013).

This has similarities to the criticism of other video game derived theories of gamification motivation such as escapism (Przybylski, Weinstein, Ryan, & Rigby, 2009), as in practice most gamification products are not fully-fledged games, but rather utilise game mechanics in their design (Hamari et al., 2014). Thus, gamification research cannot draw on existing video game theory without first identifying the specific impact of individual game mechanics, the impact of their interaction, and the influence of context on this interplay (Nacke & Deterding, 2017). This necessitates the use of broader theories of human behaviour and has resulted in the ascendance of Self-Determination Theory and its conceptualisation of the determinates of intrinsic motivation to the fore of gamification research (Hamari, 2017; Nacke & Deterding, 2017; Seaborn & Fels, 2015).

2.4.1 Self-Determination Theory

Self-Determination Theory (SDT) (Deci & Ryan, 1985) is a macro theory of human motivation that primarily focuses on the motivational pull of psychological needs satisfaction (Ryan & Deci, 2000). An important distinction is made in SDT between categories of motivational pull on the basis of the motivation arising internally or externally to an individual (Ryan, 1995), and it is this conceptualisation of intrinsic and extrinsic motivation that has proved its major contribution to gamification research (Seaborn & Fels, 2015).

SDT assigns sources of motivation into the categories of intrinsic motivation, arising internally from innate benefits such as interest or enjoyment of the task itself, and extrinsic motivation, arising from external outcomes of a task such as a rewards and punishment or social pressure (Ryan & Deci, 2000). Both intrinsic and extrinsic motivations encourage behaviour change (Cerasoli, Nicklin, & Ford, 2014). Intrinsic motivation, however, is inherently self-motivating and free from perceptions of external control (Deci & Vansteenkiste, 2004). Because of this, intrinsic motivation generally promotes better long-term behavioural maintenance (Grant, 2008; Ryan, Koestner, & Deci, 1991), greater

expenditure of effort (Cerasoli, Nicklin, & Ford, 2014; Sheldon, Elliot, Kim, & Kasser, 2001) and better wellbeing and psychological health (Ryan & Deci, 2000). Because of the effect of intrinsic motivation on behavioural maintenance, social marketing research has called for greater research into the capacity of new tools to support intrinsic motivation (Binney, Hall, & Oppenheim, 2006; Grant, 2008; Hagger et al., 2014). Intrinsic motivation is also considered the be the primary motivation behind video game use (Granic, Lobel & Engels, 2014; Ryan, Rigby & Przybylski, 2006), and thus has been suggested to be a major determinate of gamification outcomes (Hamari, 2017; Mekler et al., 2017; Nacke & Deterding, 2017; Seaborn & Fels, 2015).

In contrast, while extrinsic motivation has behavioural impact and if the extrinsic pressure is sustained can stimulate behavioural maintenance (Cerasoli, Nicklin, & Ford, 2014), it has negative implications for long term behavioural maintenance if the extrinsic pressure is ever removed. This has been observed in a variety of contexts such as the introduction and removal of payments reducing behavioural maintenance in volunteering (Frey & Goette, 1999) and blood donation (Mellström & Johannesson, 2008) as well as the introduction and removal of monetary punishments increasing the length of unnecessary stays in hospital (Holmås et al., 2010) and late pickups in day-care centres (Gneezy & Rustichini, 2000). The negative relationship between intrinsic motivation and extrinsic motivation is often referred to as '*Motivation Crowding*' or '*The Overjustification Effect*' and has been a focus of research across psychology and behavioural economics (Carlson, Neil, & Donald, 2007; Ogilvie & Prior, 1982). This has significant implications for social marketing contexts, including those in which gamification is commonly deployed, as these contexts are often lacking in initial intrinsic motivational pull and lack the budgets to maintain extrinsic motivation indefinitely (Bloom & Novelli, 1981; French, 2010; Rothschild, 1999; Thøgersen, 2005).

Identifying and understanding the factors that contribute to intrinsic motivation, and the impacts of extrinsic motivation, has therefore become an emerging focus of gamification research (Mekler et al., 2017; Nacke & Deterding, 2017). In addressing these questions, this body of research has largely utilised the fundamental SDT concept of needs satisfaction (Deci, 1975), and the SDT sub-theory Cognitive Evaluation Theory (CET, Deci & Ryan, 1985; Vansteenkiste et al., 2010).

2.4.2 Cognitive Evaluation Theory

2.4.2.1 Needs satisfaction in CET

SDT proposes that humans have innate growth tendency towards the fulfilment of three basic psychological needs: competency (the need to feel challenged but capable of mastering that challenge), autonomy (the need to possess causal agency and freedom of choice), and relatedness (the need to interact and meaningfully connect with others) (Deci & Ryan, 2002; Deci & Vansteenkiste, 2004). These needs are the foundation of intrinsic motivation, expressed as the drive for individuals to initiate behaviour that fulfils these needs (Chirkov et al., 2003). While individuals will be proactive in the pursuit of fulfilling these needs, the process is not automatic and will often require supportive features to be present in the individual's environment (Deci & Vansteenkiste, 2004). SDT therefore proposes that intrinsic motivation can be supported by features that facilitate the satisfaction of these three psychological needs and undermined by features than thwart their satisfaction (Ryan & Deci, 2000). It is proposed that intrinsic motivation is what makes motivational affordances that facilitate needs satisfaction so behaviourally compelling, mediating the relationship between needs satisfaction and behaviour (Deci & Ryan, 2002). This has been observed in research conducted in health (Schneider & Kwan, 2013), workplace (Arshadi, 2010) and education (Arnone, Reynolds, & Marshall, 2009) contexts. These findings are important to social marketers, as these behavioural contexts represent those most commonly targeted by gamification interventions (Koivisto & Hamari, 2019), with the health context representing the primary focus of the social marketing domain (Gordon, 2011).

In order to better understand and explain how needs satisfaction through features of the external environment could influence internal motivation, the SDT sub-theory Cognitive Evaluation Theory (CET) was developed (Deci & Ryan, 1985). CET largely focuses on the impact of competency and autonomy and suggests that features that support these needs, such as supportive feedback (Vallerand & Reid, 1984) or freedom of choice and informational aspects (Frederick & Ryan, 1995) respectively, will facilitate the experience of intrinsic motivation. Relatedness satisfaction is considered by CET to play more of a regulating role, where its absence negatively impacts on intrinsic motivation rather than its presence supporting it (Grolnick & Ryan, 1989).

By assessing a raft of psychological and behavioural determinates and outcomes across four different gaming contexts, Ryan, Rigby and Przybylski (2006) set out to determine if CET could predict intrinsic motivation and behavioural outcomes in video game use on the basis of needs satisfaction. They found that perceived autonomy and competence needs satisfaction was indeed associated with intrinsic motivational pull, and that this in turn predicted increased self-reported usage preferences. Importantly they also showed that perceived autonomy and competence satisfaction was related to specific game mechanic features, such as the intuitiveness of controls and the effect of game mechanics on immersion.

This research has been foundational for a number of gamification studies utilising SDT. Given that gamification is seen by many as an attempt to make behaviour more game-like (Deterding, 2011b; Hamari et al., 2014; Zhang, 2008), it would seem logical to conclude that gamification is seeking to enrich behaviour with the intrinsic motivational appeal of gameplay (Sailer et al., 2014; Zichermann & Cunninghan, 2011). It has therefore been argued that common gamification mechanics, such as badges, leaderboards and points, while not powerful motivators in their own right (Hamari, 2013), may provide visible achievement of competence and informational feedback reinforcing autonomy (Pavlas, 2010; Zichermann & Cunningham, 2011). In this way, the mechanics of gamification may encourage behavioural change through supporting intrinsic motivation.

Research has provided some support for this hypothesis, demonstrating a link between specific game mechanics, needs satisfaction and intrinsic motivation in the conceptually similar field of serious games (Pe-Than et al., 2014). Within the social marketing context of physical exercise, Peng et al. (2012) demonstrated through quantitative experimental research on a modified exercise game that the introduction of specific game features such as variable difficulty levels, avatar customisation and point scoring mechanics resulted in increased intrinsic motivational pull. Autonomy and competence needs satisfaction was found to mediate the relationship between the introduction of game features and intrinsic motivation. Additionally, while behaviour was not independently measured, intrinsic motivation did predict self-reported use intention.

However, research into gamification products specifically have yielded a variety of results as highlighted below in table 1. Mitchell, Schuster, and Drennan (2016) found that while use of a popular gamification fitness application increased and maintained increases in walking behaviour, comparative to a control group, there was no significant impact of the app on intrinsic motivation. Using qualitative feedback provided by the participants they argued that this was due to the application itself acting as an extrinsic incentive and limiting support for intrinsic motivation. Similar results were returned by Mekler et al. (2015) who attempted to test the effect of individual gamification mechanics on intrinsic motivation and performance. This study was a continuation of a previous study (see Mekler et al., 2013) in which the effect of gamification on voluntary participants was measured across four experimental groups, segregated by exposure to specific game mechanics (points, leaderboards, levels and a sans game mechanics control). Dependent variables measured were performance on an image annotation task, intrinsic motivation change and satisfaction of autonomy and competence needs. This study found that while the introduction of game mechanics increased both the number and quality of annotation tags produced, all of the game mechanics tested had no significant impact on intrinsic motivation or need satisfaction. Mekler et al.'s (2015) study therefore included a measurement of goal causality orientation (extent to which participants experienced their actions as self-determined), to attempt to explain why the game mechanics where not having their expected impact on intrinsic motivation. Again, they found that the gamification mechanics of points, leaderboards and levels produced a greater number of tags, but intrinsic motivation was not significantly impacted regardless of causality orientation. In the face of this result, Mekler et al. (2015) concluded that in their experiments the gamification mechanics were acting as extrinsic incentives, rather than supporting intrinsic motivation.

In fact, Hanus and Fox (2015) found that in a classroom setting, points and leaderboards can actually result in a decrease in intrinsic motivation at the expense of educational outcomes, with a gamified classroom returning lower intrinsic motivation and test score than a traditional class setting. They suggested that the simple gamification features used (points and leaderboards) were not being perceived as autonomy and competency boosting features as previously suggested (Pavlas, 2010; Zichermann & Cunningham, 2011), but rather as systems of control and thus amplifying extrinsic motivation. Most recently Xi and

Hamari (2019) demonstrated that gamification achievement and social features were related to the satisfaction of all three autonomy, competency and relatedness needs, while immersion was associated with autonomy alone. However, the unexpected associations between some features and all three psychological needs may also indicate limited discriminate validity. This study also did not include measures of intrinsic motivation, behavioural intention or include a baseline measurement or control condition, limiting its usefulness in establishing the determinates of gamification outcomes. Weekly use was measured as a control variable but had no significant relationship with needs satisfaction.

Table 1: Key studies of needs satisfaction/motivation in gamification and serious games

Authors	Context	Methodology	Results
Peng et al., 2012	Effect of game features on intrinsic motivation and use intention for players of exercise 'serious game'.	Experimental conditions: Autonomy and competency features on/off. Single time point.	Game mechanics correlated with higher intrinsic motivation, mediated by needs satisfaction.
Hanus & Fox, 2015	Assessing the effects of gamification on intrinsic motivation and academic performance in the classroom.	Experimental conditions: Class gamified or not. 16 weeks Longitudinal.	Gamification condition showed decreased exam performance, mediated by lower intrinsic motivation.
Mekler et al., 2015	Effects of individual gamification elements on behaviour and intrinsic motivation in image annotation task.	Experimental conditions: Task enriched with points, leaderboards and levels, or unaltered. Single time point.	Gamification elements increased task quantity, but not quality or intrinsic motivation.
Mitchell, Schuster & Drennan, 2016	Use of walking targeted gamification on behaviour and intrinsic motivation in social marketing.	Experimental conditions: Use of gamification app or not. 4 weeks Longitudinal.	App users had higher behavioural change and maintenance, no significant impact on gamification.
Xi & Hamari, 2019	Perceptions of game features in Xiaomi and Huawei online communities.	Online survey of consumer perceptions of gamification features and needs satisfaction. Single time point.	Achievement and social features related to satisfaction of all needs, immersion related to autonomy satisfaction. Weekly use showed no relationship with needs satisfaction.

These mixed results are surprising, considering the support that has been given for gamification achieving behaviour change through intrinsic motivation (Sailer et al., 2014; Zichermann & Cunninghan, 2011). In the face of these contrasting results this thesis suggests that broad qualitative research is required to clarify the area of inquiry and address the lack of consistency of outcomes between studies through identifying the factors that contribute to gamification application use and maintenance. However, while extant literature can't empirically demonstrate these factors, synthesis of prior SDT and gamification research suggests that motivation does play a vital role in gamification outcomes. This suggests that further research that clarifies the role of motivation is necessary. In particular increased discussion of extrinsic motivation highlights the need for research into the external contextual factors that may influence the way that game mechanics are experienced by users and thus impact on their behavioural outcomes (Nacke & Deterding, 2017).

2.4.2.2 Extrinsic motivation and situated affordance

One explanation for why these game mechanics are experienced differently lies within CET, specifically Deci and Ryan's (1985) observation that the motivational effects of environmental features (such as the various game mechanics used in gamification) is depended on the functional significance of the feature to the individual user and the result of post-behavioural evaluations of motivation.

These evaluations are made in regard to the two components of an external motivational influence: an autonomy restrictive component (you do this behaviour to get a reward/avoid a punishment) and a competence boosting component (you received this reward/avoided this punishment in recognition of your good behaviour) (Deci and Ryan, 1980). The most straightforward application of this principle, and the one that has dominated discussion of extrinsic motivation in gamification research (Hanus & Fox, 2015; Mekler et al., 2015; Mitchell, Schuster, & Drennan, 2016), is that features that reduce feelings of competence and autonomy, such as negative feedback and punishment or controlling rewards such as payment for behaviour, can decrease intrinsic motivational appeal (Vallerand & Reid, 1984; Deci & Ryan, 1985; Deci, Koestner, & Ryan, 1999). As an example, payment for a task once perceived as intrinsically motivating may lead an individual to consider that they are only completing the task for the monetary reward, resulting in decreased feelings of autonomy and reduced behaviour if the reward was ever removed.

However, this feature of CET also suggests that even sources of motivation that at face value are externally motivating such as payment for a task, can support intrinsic motivation if the autonomy restrictive component is perceived as less than the competency boosting component (Deci and Ryan, 1980). For example, a cash prize may be perceived as a competency boosting signal that indicates success and progress towards a mastery goal, supporting rather than undermining intrinsic motivation.

The perception of the autonomy restrictive and competence boosting components of an external feature can be influenced by a number of factors, including both the external features themselves as well as contextual cues that change the way that the features of the motivator are interpreted (Deci & Ryan, 2002). Because of this common gamification mechanics such as points and badges, which in a play setting can support intrinsic motivation by boosting competency perceptions (Ryan, Rigby, & Przybylski, 2006), may be interpreted as a means of control in autonomy restrictive environments such as the workplace (Callan et al., 2015; Korn & Schmidt, 2015), increasing perception of the autonomy restrictive component of the game mechanic and undermining intrinsic motivation (Deci and Ryan, 1980).

Discussion of gamification in the media often focus on this relationship to highlight the potential ethical issues raised by the growth of gamification (Anderson & Rainie, 2010). An example of this can be found in media reporting around the implementation of a leaderboards system for laundry workers at Disneyland Resorts in 2008. While the system was designed to encourage friendly competition and gamify cleaning, it was instead perceived negatively due to social anxiety and embarrassment in addition to fear of reprisals from management arising from the ease in which an individual's performance could be ranked relative to others (Lopez, 2011). A union organiser representing resort workers at the time highlighted the negative consequences of this, claiming the increased completion and friction with management negatively impacted on wellbeing and workplace relationships, as well as a decreased safety focus which resulted in a higher incidence of injuries (Gabrielle, 2018). With similar systems now implemented in large firms such as Target and Amazon (Gabrielle, 2018), ethical concerns have been raised for the potential misuse of this technology by managers looking to micromanage their staff, disguising coercion as gameplay (Kim, 2015). Similar criticisms have been levelled at the use of gamification by governments,

particularly the Chinese government's social credit system (Marczewski, 2017). In this system, centralized under the People's Bank of China, an individual or business is awarded or deducted points that reflect an assessment of their behaviour to establish a measure of social trustworthiness or 'Social Credit' (Zhong, 2019). While initially the system focused on dishonest and fraudulent financial behaviour (similar to credit ratings in western countries), it was quickly expanded to include a wide range of civic behaviours (Zhong, 2019). The premise of a system that incentivises positive behaviours such as donating blood, volunteering and sorting of waste is generally regarded favourably by the Chinese people (Kostka, 2019). However the deduction of points on the basis of a broad range of activities including playing loud music on public transport, failing to honour reservations made at restaurants and hotels, or promoting disunity through criticism of the government, highlights the potential for such a system to achieve its pro-social objectives via coercion, threat and the loss of personal liberties and privacy (Creemers, 2018; Marczewski, 2017; Ramadan, 2018)

These examples demonstrate that in settings where the motivational pull of gamified systems arises due to game mechanics being interpreted as methods of behavioural control, gamification may be operating through extrinsic motivation and at the expense of the intrinsic motivation to perform the behaviour and the end users' wellbeing (Kim & Werbach, 2016). If the interest of those implementing gamification and the users of gamification are misaligned in this way, then the threat of user and regulatory backlash could prove to be the greatest barrier to continued implementation of gamification (Korn & Schmidt, 2015). This is worrying for social marketers, as previously highlighted they typically operate in settings with limited initial intrinsic motivational appeal that are regulated by extrinsic motivation (Bloom & Novelli, 1981; Rothschild, 1999; Thøgersen, 2005). Ensuring that the interests of social marketers and behavioural consumers remain aligned has become an emerging area of debate in social marketing literature as theories from outside the voluntary marketing framework are explored (Spotswood, French, Tapp, & Stead, 2012), and so an investigation of extrinsic motivation would benefit both gamification and social marketing literature.

Extrinsic motivation in gamification has been explored conceptually by Deterding (2011) in a workshop for the conference on human factors in computing systems (CHI). In this paper he outlines that the autonomy supportive contexts of voluntary play are very different to the

more autonomy restrictive contexts in which gamification typically operates (such as workplaces and problem behaviour support). This is categorised in the paper as '*situated affordance*' or motivational affordance arising from the situation (environment/context). Deterding (2011) highlights that situated affordance both carries its own motivational components as well as influencing how the '*artifactual affordance*', or motivational affordance arising from the artefact (the gamification product itself), is interpreted and experienced by the user. This suggests that we should not be surprised when the transfer of game mechanics from a 'play' context into other settings does not always lead to the same motivational experience.

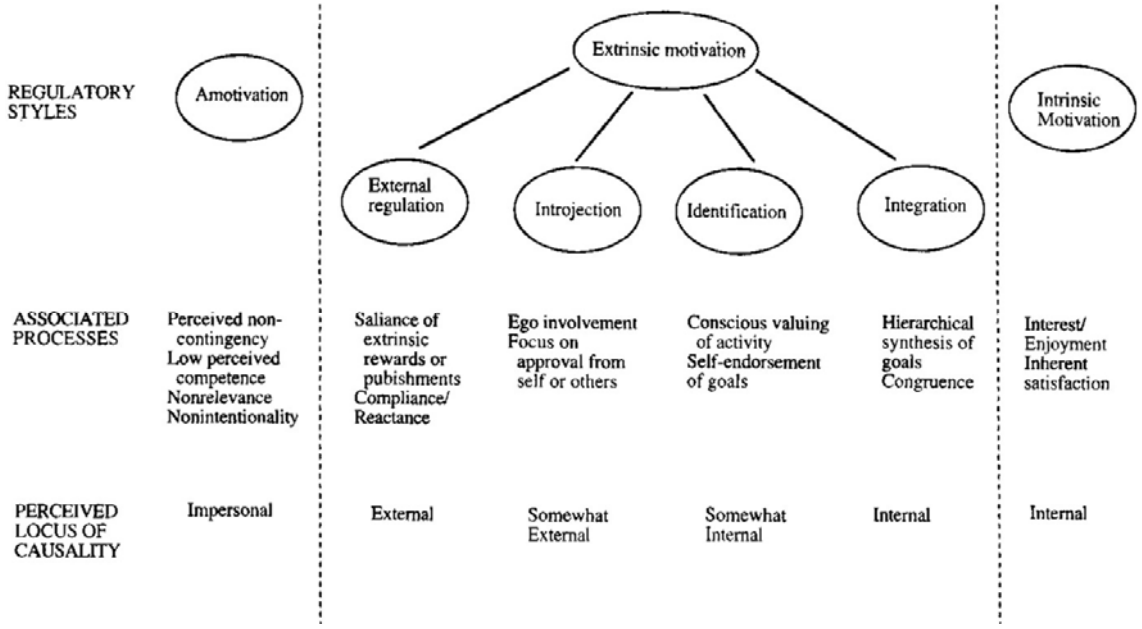
This concept of situated affordance has gained traction in gamification research, leading to calls from researchers to investigate the impact of extrinsic motivation in greater depth (Hanus & Fox, 2015; Mekler et al., 2015; Mitchell, Schuster, & Drennan, 2016). However, empirical research into the impact of context has not yet taken place. A major factor that hampers context focused research in gamification is the lack of established theoretical lens through which to derive a taxonomy and measurement scale for situated affordance in gamification research (Nacke & Deterding, 2017). This further underscores the need for qualitative research to better clarify this area of inquiry, but also highlights the need for exploration of appropriate theory through which to interpret the findings of such research (Bryman, 2008). To this end, the following section outlines the sub-theory of SDT most commonly associated with understanding how extrinsic motivation is interpreted by individuals: Organismic Integration Theory (OIT) (Deci & Ryan, 1985).

2.4.3 Organismic Integration Theory

Organismic Integration Theory (OIT) concerns the way in which external pressures are interpreted by individuals and seeks to assess how some external sources of motivation can be internalised and thus become self-regulated and autonomous (Deci & Ryan, 1985). Rather than viewing extrinsic motivation as a dichotomous opposite to intrinsic motivation, it proposes that extrinsic motivation can be interpreted through a continuum of regulatory styles differentiated by the degree to which the extrinsic motivation has been internalised. This internalisation process is the importation process of assimilating extrinsic motivations such as rewards or social pressure into personally held beliefs and attitudes, resulting in a greater perceived locus of causality (Vallerand, 1997). As the locus of causality grows the

autonomy restrictive component of the external motivator becomes less apparent while perception of the competence boosting component is heightened, with the result that the motivator becomes self-regulating and ceases to undermine needs satisfaction (Deci and Ryan, 1980). An example of this would be striving for a reward for the sake of demonstrating excellence to yourself, rather than out of desire for the reward itself. While this process occurs on a continuum, it is important to note that individuals can take in extrinsic motivation through any regulation style and do not need to pass through styles sequentially (Ryan, 1995). Figure 1 below highlights this taxonomy of regulatory style within OIT, arranged from left to right in order of perceived locus of causality.

Figure 1: OIT Taxonomy of Regulatory Styles (Ryan & Deci, 2000)



Deci and Ryan (1985) proposed that the more internalised the regulatory style used to interpret the extrinsic motivation, the more autonomous the behaviour, as the individual would find the behaviours self-reinforcing and cease reliance on the extrinsic motivational affordances. Regulatory styles perceived as externally controlling such as external regulation and introjection diminish behavioural maintenance, while internalised regulatory styles such as identification and integration promote maintenance. Importantly, however, even the more integrated regulatory styles such as identified regulation and integrated regulation are

still not intrinsic, as they are not derived from internal features of the behaviour but that of its instrumental or functional value (Deci & Ryan, 2002; Deci & Ryan, 1995).

In support of this, Ryan & Deci (2000) cited evidence from a variety of contexts, including education (eg Miserandino, 1996), health care (eg Williams et al., 1996) and environmental behaviour (Green-Demers, Pelletier, & Menard, 1997). A more recent, and widely cited, example is Ryan, Patrick, Deci, and Williams' (2008) research in a physical activity context. They found that intrinsic motivation such as enjoyment was the strongest predictor of exercise and sporting behavioural maintenance. Extrinsic motivations such as fitness goals and social pressure were not predictors in and of themselves. However, when these motivations were internalised as integrated regulation (fully assimilated motivations that form a component of self-identity) or as identified regulation (motivations considered personally important, such as upholding values), the motivation became autonomous and began to predict long term behavioural maintenance (Ryan, Patrick, Deci, & Williams, 2008).

The regulatory style through which individuals experience extrinsic motivation prior to attempted behaviour change is dependent largely on an individual's prior experience and interpersonal climate (Deci & Ryan, 1985; Ryan, 1995). Deci and Ryan (1991) postulated that when external prompts are made by significant others or salient reference groups, individuals internalise the motivation more readily, forming initial behavioural perceptions and reinforcing patterns of behaviour. In cases where prompts are made by non-salient reference groups, as is unfortunately commonly the case for social marketing efforts which are typically government sponsored (Ruxton & Saunders, 2016), even well-meaning external rewards and messaging can be perceived as externally regulating or irrelevant. In essence, the behavioural consumer does not value how the social marketers perceives their behaviour and so fails to internalise the motivation prompts. This is further undermined by the limited initial value many individuals place on achievement in social marketing contexts (Dibb & Carrigan, 2013; Hastings, 2003, 2007). In cases where the behaviour has limited perceived utility to the individual, feelings of autonomy will be diminished and more externalised regulatory styles will be expressed (Ryan & Deci, 1985). Collectively this suggests that a key challenge facing the use of extrinsic motivational prompts in social marketing, is in overcoming initial externally controlled regulation styles due to their negative impact on behavioural maintenance and wellbeing. Importantly, however, while the

degree of internalisation of regulatory style has been linked to behavioural outcomes in social marketing contexts such as exercise (Ryan et al., 2008), limited research in other social marketing contexts have incorporated OIT regulatory style measures. Because of this it is difficult to draw conclusions as to the prevalence of particular regulatory styles in social marketing contexts more broadly.

While extrinsic motivation is still capable of encouraging behaviour change in individuals utilising an external regulation style (Cerasoli, Nicklin, & Ford, 2014), the motivation will not be internalised and thus behavioural maintenance will suffer if the motivation is removed or the value of the motivation to the individual negatively re-evaluated. In the case of gamification, it has been proposed that the novelty of the application may inflate the value of game mechanics to the user (Schmidhuber, 2012) and thus as this novelty wears off users may discontinue use (Farzan et al., 2008). This has implications for gamification mechanics that act may act to support extrinsic rather than intrinsic motivation. In studies such as Mekler et al. (2015), Mitchell, Schuster, and Drennan, (2016) and Hanus and Fox (2015) where it is proposed that gamification mechanics were acting as extrinsic incentives, the ability of the game mechanics used to impact behavioural change may be dependent on the regulatory style through which they are experienced. Differences in regulatory style might then explain the differences in behavioural impact observed. In an autonomy controlling classroom setting (Hanus & Fox, 2015), the game mechanics may be perceived as attempts at external regulation and largely irrelevant to personal goals and self-image, decreasing intrinsic motivation and potentially harming effort. In a more autonomy supportive environment such as a voluntary exercise context (Mitchell, Schuster, & Drennan, 2016) or in voluntary human computation tasks (Mekler et al., 2015), the game mechanics could serve as clearer connection between participants' efforts and their performance. In this way, for individuals with internalised regulatory styles relating to the behaviour, gamification mechanics such as points, leaderboards and badges could achieve behavioural outcomes via demonstrating progress towards individual goals or growth in competence in behaviours considered valuable to the individual (Jung et al., 2010; Von Ahn & Dabbish, 2008).

This might suggest that gamification is most impactful when the individuals targeted are already expressing internalised motivation styles such as integrated or identified regulation. This is supported by qualitative research by Cruz, Hanus, and Fox (2015) on the value placed

by users on video game achievement systems. They found that achievement systems could be experienced as intrinsically motivating through boosting competence perceptions, or extrinsically motivating through social status signals or short-term ego boosts. Alternatively, the achievement systems could be considered irrelevant and largely ignored. Cruz, Hanus, and Fox (2015) highlighted that the key individual difference that drove these different outcomes was the functional significance of the achievement to the user. While they do not discuss OIT in their study, it is possible that differing regulatory styles towards the game mechanics could offer a good explanation for the differences between users they observed.

If gamification outcomes were dependent on the user's regulatory styles this would have implications for its use in social marketing. In the pursuit of behaviour change, social marketers seek to both encourage initial behavioural change and to then maintain this change (Hastings, 2007). In behavioural intervention research, stage-based models of behaviour change have been used to demonstrate the differences in characteristics between individuals in different stages of 'readiness' to change to better tailor programs and treatments to their specific needs (Weinstein, Rothman, & Sutton, 1998). One of the most popular stage-based models in behavioural intervention research is the Transtheoretical Model of Behaviour Change (TTM; e.g. DiClemente & Prochaska, 1982). This model suggests that individuals pass cyclically through five distinct stages of change; Pre-contemplation, Contemplation, Preparation, Action and Maintenance (Prochaska et al., 1985; Prochaska & Goldstein, 1991). OIT guided research using the lens of TTM suggests that self-determined and internalised motivations such as identified and integrated were associated with later stages of change, while individuals in the precontemplation phase were regulated externally (Daley & Duda, 2006; Mullan & Markland, 1997). This suggests the utility of gamification to social marketing may be limited to contexts in which the social marketer is producing tools to encourage behavioural maintenance in a target market that has already begin to think about the benefits of the targeted behaviour. This would be in keeping with the traditional role of social marketing, with Andreasen (2004) suggesting that social marketing's strength is in changing supporting behaviour change once individuals are in the contemplation stage, relative to educational approaches that help transition individuals from precontemplation to contemplation. Importantly however, no extant research has examined the role of regulation style on gamification outcomes, and only very limited research has examined the role of

regulation style on behaviour in social marketing contexts (see Daley & Duda, 2006 and Hagger, Chatzisarantis, & Harris, 2006). Further, no research has been conducted as to the impact of regulatory style on social marketing interventions more broadly. Considering the importance of regulatory style to the behavioural impacts of extrinsic motivation, and the growing arguments that in many contexts gamification acts as a source of extrinsic motivation (Mekler et al., 2015; Mitchell, Schuster, & Drennan, 2016), addressing this research gap is an important expansion to both gamification and social marketing literature.

An individual's motivation style is not set, however, and will change over time. Indeed, Ryan and Deci (1985) propose that individuals are naturally inclined to integrate their experiences provided they are given their extrinsic prompts from a source they value in an environment that supports their psychological needs. Gamification could theoretically provide such a needs supportive environment through game mechanics that support competence and autonomy (Pe-Than et al., 2014; Peng et al., 2012), as well as achievement features that may serve as social status signals to amplify existing social reinforcement (Cruz, Hanus, & Fox, 2015). However, there is also some evidence that gamification could struggle to significantly alter regulation styles. While Pe-Than et al. (2014) provide empirical support for the proposition that gamification mechanics can support competence and autonomy needs satisfaction, their study recorded data at a single time point and so could not discount the potential of a novelty effect (Hamari, Koivisto, & Sarsa; 2014). Importantly, they also did not include measure of relatedness needs satisfaction. While competence and autonomy are the key contributors to supporting intrinsic motivation (Frederick & Ryan, 1995), relatedness satisfaction is the most important factor of external motivation integration (Deci & Ryan, 1985). While there is qualitative research that may suggest that visible achievement signals provided by some game mechanics may help fulfil this need by providing a narrative in which the user is reminded of the importance of the behaviour (Cruz, Hanus, & Fox, 2015), this finding has yet to receive quantitative support. Indeed, given that governments and other social change agents are rarely salient and influential groups to the individuals targeted by social marketing (Ruxton & Saunders, 2016), gamification in social marketing contexts may struggle to facilitate this need. Despite the discussion of extrinsic motivation in the gamification literature (Mekler et al., 2015; Mitchell, Schuster, & Drennan, 2016), to date no study has quantitatively assessed the impact of gamification on extrinsic motivation or

regulatory styles.

Addressing this research gap contributes to both gamification and social marketing literature in several important ways. Firstly, the factors that contribute to the internalisation of extrinsic motivation are largely conceptual, with limited research highlighting the impact of behavioural interventions on this process. Given the importance of regulation style to the behavioural response to extrinsic motivation (Ryan & Deci, 1995), understanding if social marketing tools such as gamification can contribute to this process or not is of significance to social marketers.

2.5 Research Questions

This section presents the research questions of this thesis. First, Section 2.5.1 draws from the previous section's examination of extant social marketing literature (Section 2.1 and 2.2), gamification literature (Section 2.3) and self-determination theory literature (Section 2.4) to summarise the key gaps identified across this literature review. Following this, Section 2.5.2 presents the research questions of this thesis, design to address the gaps identified in section 2.5.1.

2.5.1 Summary of key gaps in the literature

GAP 1: Limited extant research into the determinates of the maintenance, rather than adoption, of behaviours in social marketing.

Section 2.1 highlights that while social marketing is derived from commercial marketing, it has several important distinctions (French, 2012; Rothschild, 1999). A major source of difficulty in social marketing programs comparative to commercial campaigns is that the behaviours commonly targeted by social marketing require maintenance for prolonged periods of time before social good can be achieved (Dibb and Carrigan, 2013). The difficulties consumers face in performing societal behaviours and their limited perceptions of the behaviours benefits present significant barriers to social marketing campaigns (Hastings, 2007; Rothman, 2000). Innovative technologies may help address this by providing support for intrinsic motivation, helping to create a sustained behavioural pull (Blair, 2017; Manikam & Russell-Bennett, 2016; Mitchell et al., 2017; Mulcahy et al., 2015), However, as highlighted in this section, social marketing research has shown a bias towards behavioural initiation

rather than sustained maintenance (Andreasen, 2003, 2004; Rundle-Thiele et al., 2019). While intrinsic motivation has been discussed in the social marketing literature, the factors that underpin the ability of social marketing to support it are poorly understood (Binney, Hall, & Oppenheim, 2006; Grant, 2008; Hagger et al., 2014). Addressing this gap is therefore an emerging focus of social marketing research (French & Russell-Bennett, 2015).

GAP 2: Limited social marketing research examines the determinants of consumers' use of products

Social marketing has typically considered the product component of the marketing mix to refer to the benefits of the target behaviour being 'sold' (Lefebvre, 2011), allowing for the conceptualisation of campaigns in which no physical products are produced (Andreasen, 2004; Gordon, 2011). While this focus reflects the importance of behaviour change to social marketing (Andreasen, 2004; Bloom & Novelli, 1981), the interchangeability of 'actual' products and behaviour in social marketing research limits the ability of research to identify the determinates of social marketing 'actual' product success (Edgar, Huhman, & Miller, 2017; Thackeray, Fulkerson, & Neiger, 2012). Addressing the gap is of importance to social marketers, given the capacity of such products to help support the marketing of behaviours otherwise unpalatable to consumers (Rothschild, 2009; Smith, 2009).

GAP 3: Limited social marketing research examines the determinants of consumers' use of technology-based products instrumental to achieving societal goals.

There is growing uptake of Digital and technological products in social marketing (Lee & Kotler, 2019; Lefebvre, 2009), reflecting the increased accessibility and attractiveness of these products to consumers (Anderson, 2019). In particular, the use of mobile devices to support consumer driven behaviours change has become a focus in social marketing research (Gallegos, Russell-Bennett, & Previte, 2011; Lee & Kotler, 2019; Schuster, Drennan, & Lings, 2013), drawing upon the existing positive relationships consumers have with mobile technology (Fogg, 2007; Whittaker, 2012). However, high rates of attrition and low engagement continue to plague these interventions (Patrick et al., 2016; Eysenbach, 2005). Social marketers have a limited body of research into the determinates of technology based social marketing product success upon which to base their campaigns (Mulcahy, Russell-Bennett, & Rundle-Thiele, 2015). Because of this, expansion of research that incorporates

theory from technology-based domains is supported by the literature (Blair, 2017; Manikam & Russell-Bennett, 2016).

GAP 4: Extant gamification literature not achieved consensus on the determinates of gamification's initial or sustained use.

While research largely supports gamification's ability to support positive behavioural impact across a range of contexts (Hamari et al., 2014) there still does not exist a consensus on how gamification achieves outcomes or what factors contribute to its success (Nacke & Deterding, 2017). In particular, while gamification has been shown to support behavioural maintenance in the social marketing domain of physical activity, the determinates of sustained gamification use is still unclear (Mitchell et al., 2017). In order to better inform the use of gamification in social marketing, where behavioural maintenance is a priority (Bloom & Novelli, 1981; Hastings, 2007), it is therefore necessary to address this gap.

GAP 5: Extant research is unable to explain why SDT informed research in gamification deviates from findings in other contexts.

SDT has emerged as a key theory in understanding the motivational pull of gamification (Nacke & Deterding, 2017). Conceptual arguments and research from video games and serious games contexts draw on SDT to highlight the capacity of gamification to achieve behavioural outcomes through intrinsic motivation (Deterding et al., 2011b; Hamari et al., 2014; Peng et al., 2012; Ryan, Rigby, & Przybylski, 2006). However, existing literature has been unable to explain why some gamification interventions have had behavioural impact despite lacking impact on intrinsic motivation (Mekler et al., 2017; Mitchell et al., 2017) or why gamification in some contexts has been shown to undermine intrinsic motivation (Hanus & Fox, 2015). It has been suggested that this may be because current literature has not explored the role of extrinsic motivation in gamification outcomes (Nacke & Deterding, 2017; Mitchell et al., 2017) and thus an expansion in the way that SDT is applied within this context may be warranted.

2.5.2 Research questions to be addressed

The overall research question (ORQ) of this thesis is:

What are the key determinates of consumers' use of gamification products?

This research question affords a wide range, a necessary feature in order to address the key gaps identified in this literature review. First, as an emerging technology product in the social marketing field, understanding the determinates of the use of gamification products will provided a deeper understanding of the factors that contribute to behavioural maintenance more broadly (Gap 1) as well as those specific to social marketing products and technology-based products more specifically (Gap 2 and Gap 3).

In answering this research question, this thesis will address the major limitation of extant gamification literature, namely its inability to arrive at a consensus regarding the determinates of gamification outcomes (Gap 4). The incorporation of new theory in and answering of this question will also help to identify the differences between video game and serious game contexts, explaining the differences between extant gamification research and addressing Gap 5.

To address this overall research question, two sub-research questions (RQ's) have been developed:

RQ1: To what extent does SDT explain consumers' use of gamification products?

This first sub-research question will seek to address the ORQ by first assessing the existing theoretical frameworks that have informed gamification research to date, namely that gamification's behavioural impact is underpinned by its capacity to create intrinsically motivating game-like experiences through needs satisfaction (Hamari, 2017; Mekler, Brühlmann, Tuch, and Opwis, 2013; Seaborn & Fels, 2015). Existing research that has explored the ability for gamification to support intrinsic motivation has delivered mixed results (Mekler et al., 2017). They often suffered from methodological issues such as measuring intrinsic motivation but not needs satisfaction (such as Mitchell et al., 2017) or measuring needs satisfaction but not use intention (such as Xi & Hamari, 2019), and thus new research will first have to clarify this relationship and the ability of SDT to accurately predict outcomes in gamification research (Nacke & Deterding, 2017).

Importantly however, the current use of SDT in gamification research itself may be creating limitations as to how these current results can be interpreted, due to lack of measures of the role of situated affordance (Deterding, 2011 May; Nacke & Deterding, 2017). Thus, addressing the ORQ may require the incorporation of new theory. Previous research has highlighted the possibility of extrinsic motivation impacting on gamification outcomes and has called for an expansion of theory that incorporates taxonomy and measures capable of identifying this possible outcome determinate (Deterding, 2015; Nacke & Deterding, 2017; Mekler et al., 2017; Mitchell et al., 2017). This literature review identifies a sub-theory of SDT, organismic integration theory (OIT), as potentially useful in the development of this taxonomy and measurement strategy, and so posits the second sub-research question (RQ2) of this thesis:

To what extent does OIT explain consumers' use of gamification products?

2.6 Conclusion

This chapter delineated a review of the literature pertaining to social marketing products, highlighting that these products face different challenges to those in commercial marketing and the importance of drawing on theory to inform social marketing programs that incorporate them. This literature review then highlighted the rise of gamification as a behaviourally impactful technology-based product in social marketing contexts but indicated that there was still much to understand regarding the determinates of its behavioural impact. This is followed by a summary of the key gaps identified in this literature review. In order to build on this understanding and address these gaps, this thesis outlines an ORQ guided by two sub-theories, designed to identify the determinates of gamification's sustained use. In particular, the potential role of extrinsic motivation on gamification outcomes is identified. The next chapter describes the broad research design proposed by this thesis to address these research questions, as well as the research context it will take place in.

Chapter 3: Justification of the Research Context and Design

In the previous chapter, the theoretical foundation of the research was established. It was determined that this thesis seeks to address the overall research question: ORQ: What are the key determinates of consumers' use of gamification products? Two sub-questions functional to addressing this overall research question were also developed in Chapter 2: RQ1: To what extent does SDT explain consumers' use of gamification products? and RQ2: To what extent does OIT explain consumers' use of gamification products? This chapter presents the justification of the research design employed to address these research questions.

Section 3.1 begins by situating the research within the context selected. Following this, Section 3.2 presents the overall research design, beginning with a discussion of its philosophical underpinnings. An overview of the research program, comprising a Two-study mixed-method design, is subsequently presented. Last, this chapter provides the justification for the methodological approach of each of the studies, including the data collection, sampling and analytical methods employed. However, it does not include an account of the implementation of the research methods. Rather, this is provided in the subsequent chapters (Chapters 4 and Chapter 5), which delineate the method and limitations of each of the two studies, their findings and the implications of those findings within a journal article format.

3.1 Research Context

The implementation of gamification through phone-based applications was selected as the focus of this research, explored through both the workplace and health contexts. It was necessary to select a specific context for this research, so that contextual factors impacting on the use of these gamification applications could be identified as is called for in the extant social marketing and gamification literature (as outlined in section 2.4.2 and 2.4.3).

Further explanation and justification of the contexts selected, and a justification for the focus on phone-based applications is provided in the following sections.

3.1.1 Technology-based services in social marketing

In addressing the initial 'unattractiveness' of many of the behaviours targeted by social marketing, marketers often deploy goods and services to support their interventions by adding value/utility or reducing the costs and barriers of engaging in the targeted behaviour (Rothschild, 2009; Smith, 2009). Given that social marketing behaviours face significant behavioural competition both from organisational (originating from an entity, such as a fast food company) and individual (originating from an individual, such as inertial resistance) sources (Noble & Basil, 2012), these social marketing interventions must demonstrate better behavioural exchange than alternative behaviours (Schuster, 2015). While social marketing products have been shown to improve the outcomes of these interventions across a variety of contexts (Grier & Bryant, 2005), they have several limitations to their adaptation. Chiefly, the prohibitive expense of supporting product-based interventions over the long term has led many social marketers to consider other delivery options such as digital or technology-based services (Bloom & Novelli, 1981; Lefebvre, 2009; Whittaker, 2012).

However, compared to physically implemented and face to face interventions, technology-based interventions suffer from higher attrition rates arising from the ease in which these services can be discontinued (Eysenbach, 2005). For instance, while an online physical support service' participant's showed positive service perceptions, the program had high attrition and a low willingness to use the service for more than a short period (Anhøj & Jensen, 2004). Similar attrition rates in technology interventions have been found across a variety of contexts with an online panic disorder self-help program reporting a 1% completion rate (Farvolden, Denisoff, Selby, Bagby, & Rudy, 2005) and an online cognitive behaviour depression intervention reporting a 0.5% - 22.5% completion rate (Christensen, Griffiths, & Jorm, 2004).

This suggests the positive relationship most consumers have with technology (Fogg, 2007) alone is not sufficient to ensure that the behavioural exchange is positive for consumers of technology-based behaviour change programs (Hastings, 2003; Lee & Kotler, 2019). Eysenbach (2005) suggests that to overcome the ease of which a technology-based service can be abandoned, these interventions have an even higher requirement to demonstrate positive behavioural exchange. This has important implications for the utilisation of technology-based interventions such as gamification, as without understanding the

components of the behavioural exchange they offer it is difficult to optimise their design and implementation to maximise behavioural adherence.

Given that a major limitation of extant gamification research is the lack of consensus on how it achieves behavioural outcomes, and partially how context impacts these outcomes (Deterding, 2014; Lewis, Swartz, & Lyons, 2016; Mekler et al., 2017; Seaborn & Fels, 2015), this presents a major limitation to gamifications use in social marketing.

3.1.2 Mobile gamification applications

In addressing this gap, this thesis will investigate gamification through the use of voluntary phone-based applications (apps). While gamification can be implemented in many ways, such as gamified surveys, websites and even physical workplaces (Hamari, Koivisto, & Sarsa, 2014), the use of phone-base mobile interventions best reflects the way that gamification is typically implemented in social marketing contexts (Lister et al., 2014).

Mobile based interventions have proven popular in social marketing as they present a tremendous opportunity to utilise consumers' pre-existing positive relationships with their devices to build positive behavioural exchange and persuasive power (Fogg, 2007; Whittaker, 2012). Examples of successful technology-based product offerings include the use of mobile health breastfeeding support (Gallegos, Russell-Bennett, & Previte, 2011), the use of mobile mental health services (Schuster, Drennan, & Lings, 2013) and the online and phone administration of physical exercise programs (Hurling et al., 2007).

The focus on voluntary phone-based applications will also help address the limited extant research into motivation and other behavioural antecedents in naturalistic settings (Deterding, 2014; Seaborn & Fels, 2015). This will additionally address the limitation of autonomy restrictive, experimental condition-based research, which may occlude observations of the capacity of gamification to support psychological needs satisfaction (Korn & Schmidt, 2015; Mekler et al., 2017; Mitchell et al., 2017). To this end, this thesis will investigate the use of phone-based gamification apps across physical exercise and workplace contexts.

3.1.3 Gamification in social marketing for physical fitness

As stated in Section 2.1.3, socially beneficial behaviours are often initially less attractive to consumers owing to the diminished relationship between undertaking these behaviours and tangible, immediate and valued benefits to the consumer (Dibb & Carrigan, 2013; Hastings, 2003, 2007). In particular, physical fitness has proven difficult to support due to the effort expended and the need to maintain this effort over relatively long periods of times in order to receive health benefits (Hastings, 2007).

This has been compounded by changes to both workplace and typical entertainment offerings that have resulted in increasingly sedentary lifestyles (Healy et al., 2008). As such, limited physical activity presents a major health concern with 63% of Australians aged 18 and over being classified as overweight or obese (AIHW, 2018). Considering that even moderate increases to physical activity (such as a single hour of walking) can have profound health benefits if maintained (Norton, Norton, & Sadgrove, 2010), social marketers have sought to leverage a variety of marketing strategies to address this challenge (Lee & Kotler, 2019).

However even exercise interventions that are considered successful will typically struggle with high rates of attrition, with Wilson and Brookfield (2009) highlighting a loss of 50% of participants within the first six months. Supervised interventions are considered a good way to overcome this attrition rate, and often demonstrate positive changes in exercise behaviour over the short term (Cox et al*.,* 2003; King, Rejeski, & Buchner, 1998). A major limitation of these interventions, however, is the significant cost involved in maintaining supervision over the long term and the lack of lingering benefit once the supervision is ceased (Cox et al., 2003; Shephard 1992). It is for this reason that social marketers increasingly turn to technology-based solutions to help support changes in exercise behaviour (Lee & Kotler, 2019).

In investigating the capacity of various interventions to influence exercise behaviours, researchers have turned their attention to the recent proliferation of commercial gamification phone applications that offer consumers the tools they require to help reinforce their own exercise behaviour (Lister et al., 2014). The market for these user-directed fitness tools has seen explosive growth, with projections that the fitness app market will reach 14.7

billion by 2026 (Polaris, 2018). The recent precipitous growth of Pokémon Go in this context has blurred the line between gamification and traditional entertainment focused games, given the lack of explicit focus on behavioural outcomes. This application's use of game mechanics to incentivise a non-game context (walking and exploration) has resulted in significant increases to physical activity amongst its users (Althoff, White, & Horvitz, 2016). This has led many to speculate as to how the design features of this product can be applied to other gamification applications and interventions (Clark & Clark, 2016).

The research of gamification in this exercise context has returned largely positive results; Hamari & Koivisto (2013) demonstrated that the commercial gamification product 'Fitocracy' could support behavioural intention to exercise through the provision of social factors. Further, Southerton (2013) provided an autoethnography of gamified running apps, demonstrating the benefits of immersion on behavioural intention. Mitchell et al. (2017) demonstrated that a commercial gamified app 'The Walk' had significant behavioural impact on walking behaviour and maintenance, however they could not provide an explanation for this outcome given that the use of the app did not have a significant impact on intrinsic motivation (enjoyment) of the walking behaviour.

This is a significant gap in the extant research, given the importance that intrinsic motivation has in the maintenance of exercise behaviour (Hagger, Chatzisarantis, & Harris, 2006) and the links between intrinsic motivation and gamification use in other contexts (Deterding, 2011; Nicholson, 2012). This thesis will therefore seek to identify the features that contribute to gamification supporting intrinsic motivation and behavioural maintenance in an exercise context.

3.1.4 Gamification in internal marketing (marketing as HR)

As identified in section 2.4.2, a major criticism of the use of gamification is the potential for this technology to amplify extrinsic pressures, such as fear of reprisals or social embarrassment. This is particularly true when the gamified product in question is being supplied by external agents such as governments and businesses who have an interest in changing the end user's behaviour, rather than being sort out voluntarily by the end user directly (Ferreira et al., 2017). In these situations, the interests of external agents and end users may be misaligned with the gamified system being used to achieve behavioural goals

at the expense of the users' well-being or dignity (Kim & Werbach, 2016). Ensuring that the interests of social marketers and behavioural consumers remain aligned has proven more difficult as social marketing increasingly draws upon theories and technologies beyond the traditional voluntary marketing framework, resulted in ethical issues such as this becoming an emerging area of debate in the social marketing literature (Spotswood, French, Tapp, & Stead, 2012). It is for this reason this thesis identifies the importance of exploring the impact of extrinsic motivation in gamification.

However, within the typical social marketing domain of physical activity, it may be difficult to measure the impact of these coercive extrinsic pressures given that the majority of extant gamification app use in this setting is both voluntary and self-directed (Lister et al., 2014). For this reason, this research will also investigate the use of gamification in the more autonomy restrictive context of the workplace (Callan et al., 2015; Korn & Schmidt, 2015), through the lens of internal marketing.

As social marketing considers the capacity for marketing tools to be deployed in pursuit of behaviours that contribute to social good (Andreasen, 2002, 2003), so too has internal marketing considered the role of marketing tools in aligning employees with the management vision of the organisation (Varey & Lewis, 1999). The development of this practice began with the observation that, similar to external customers, internal employees pursue behaviour that maximises their value exchange and thus by applying an 'employee as customer' model to internal communications managers can better satisfy the needs of their workforce to enhance motivation and retention (Berry, 1981).

A major focus of internal marketing in recent years has been on employee retention and engagement (Özçelik, 2015). This has largely arisen out of necessity, as changes to the labour marketplace have not only made changing jobs easier, but changes to modern workplaces through greater specialisation have also largely made the work itself less innately satisfying to employees (Dobre, 2013; Ertürk & Vurgun, 2015). Internal marketing has sought to address this through the various tools of marketing communications, for example the use of internal branding to improve the loyalty of employees and foster a sense of belonging (Özçelik, 2015). This has been particularly observed in recent years through a greater focus on communicating corporate social responsibility programs internally, due to the positive

impact this has on attitudes and workplace behaviours (Brammer, He, & Mellahi, 2015).

As with social marketing however, the provision of internal marketing services often involves the provision of goods and services that support the main internal marketing 'product', the job itself (Rafiq & Ahmed, 1993). Gamification has been presented as one such internal marketing product to help managers address swingling employee engagement (Hamari, Huotari, & Tolvanen, 2015; IEEE, 2014). As an example, the gamification application Evaluagent allows managers to set tasks through a digital goal-orientated framework and the provision of virtual rewards and instantaneous feedback to employees who are pursuing and completing these tasks. While the gamification of the workplace has largely returned positive behavioural and behavioural antecedent outcomes (Hamari, Koivisto, & Sarsa, 2014; Oprescu, Jones, & Katsikitis, 2014), it has also raised concerns that the gamification of this context may present ethical dilemmas for managers (Bogost, 2013; Kim & Werbach, 2016).

Scoring metrics and game mechanics such as points and leaderboards may be important in establishing the motivational pull of many voluntary video games (Peng et al*.,* 2012). However, when the use of these metrics becomes a performance measure rather than supportive feedback in the workplace, these mechanics can become controlling and restrict the behaviour of employees via extrinsic motivation (Callan et al*.,* 2015; Korn & Schmidt, 2015). This has negative impacts for the use of gamification in the workplace, given the association of extrinsic pressure on employee distress and increased turnover (Gagné et al., 2010). This also presents an important ethical dilemma for marketers and managers, as it suggests that in some instances gamification achieves behavioural impact through extrinsic pressure rather than positive behavioural exchange, signifying that the tool may have organisational benefits but be detrimental to employees' intrinsic motivation to work (Kim & Werbach, 2016).

It is for this reason that exploring the research context of the workplace may allow for a better understanding of contextual factors that influence how gamification is interpreted and address the calls for research into extrinsic motivation in both the social marketing and gamification literature (Hagger et al., 2014; Nacke & Deterding, 2017).

3.2 Research Design

The preceding section has highlighted that a key limitation of the current literature is a limited exploration of the role of motivation in gamification outcomes, both intrinsic and extrinsic. To this end, this thesis will examine the relationship between motivation and gamification through a series of quantitative and qualitative studies. This section provides both the outline and justification of the research design and methodology that will be employed in this examination.

First, Section 3.2.1 outlines with paradigmatic perspective and assumptions that underpin the methodology of this thesis. Secondly, Section 3.2.2 outlines an overview of the three-study research program, incorporating a mixed-method design. This is followed by an in-depth description, and justification, of the data collection, sampling and analysis procedures employed in each of these studies. The operationalisation of these methods is presented, along with the results of each study, in the following chapters 4, and 5.

3.2.1 Paradigmatic perspective of the research

In proposing any methodological approach, researchers must be mindful of any assumptions regarding the nature of reality they are making in their research (Cavana, Delahaye, & Sekeran, 2001). The belief's held by the researcher regarding key constructs such as knowledge and truth, form the guiding paradigm of a research project (Veal, 2005). Understanding and defining the paradigmatic perspective taken is an important part of explaining a projects research methodology, as this perspective will influence the design and execution of a study as well as the interpretation of its results (Mir & Watson, 2000).

By building upon the foundation of extant study and theory, this body of research is guided by a post-positivist paradigm (Annells, 1996). Under this paradigmatic lens the existence of an underlying objective reality (or truth) is assumed, but with the pragmatic assumption that any understanding or exploration of this truth will be rendered imperfect through the inherent biases and limitations of indirect observation (Wahyuni, 2012). Due to this assumption of a probabilistic understanding of reality, post-positivist research accepts that findings will only ever be provisionally true, in contrast to objectivist paradigms that hold that sufficiently rigorous methodology can reveal the underlying absolute truth (Lincoln,

Lynham, & Guba, 2011). Research conducted with this paradigmatic perspective therefore places great importance on the incremental expansion of theory and research, verifying or falsifying previous findings to move towards a more accurate understanding of the underlying objective reality (Aronson, Harré, & Way, 1995).

In seeking to investigate the theoretical underpinnings of gamification derived behaviour change through this paradigmatic lens, this research is informed by social psychology theory such as SDT as outlined in Section 2.4. This approach, to build upon extant knowledge, reflects the philosophy of "knowledge accumulation through accretion" inherent to post-positivism (Guba & Lincoln, 2005, p. 194). However, to best reflect the paradigmatic perspective of a provisional (rather than absolute) understanding of truth, this study utilises a mixed methodology to apply both quantitative and qualitative methodology to our research questions. This combination of methodology allows the study to develop rich contextual understanding through qualitative research methods to compliment and better inform the more externally valid findings generated by quantitative research (Bryman, 2008). This complementarity between research methodology thus mitigates many of the inherent biases present in either methodology individually and empowers the post-positivist researcher to arrive at a more complete understanding of the research problem (Johnson & Onweugbuzie, 2004).

3.2.2 Overall research program

As highlighted in Section 2.4, while motivation is an emerging area of inquiry in gamification research (Hamari, Koivisto, & Sarsa, 2014) there is still considerable uncertainty in this sphere due to the prevalence of conflicting findings (Dey & Eden, 2016). Given the multidimensional complexity of the research problem this conflict represents, a mixed-methods research approach is an appropriate tactic to maximise the potential for the study to identify the possible contextual factors that may be contributing to these varied findings (Baum, 1995; Harrison & Reilly, 2011). Through the combination of both qualitative and quantitative methodology, data can be integrated and triangulated to increase the validity of any conclusions drawn by the research and the potential of replicating bias or failing to identify key variables minimised (Axinn & Pearce, 2006). An outline of this design is presented in Table 2.

This research employs this mixed-method design sequentially to first clarify the area of inquiry before exploring specific relationships in more detail (Hesse-Biber, 2010). The initial Study One explores motivation in gamification broadly, seeing to explore the gameplay and contextual determinates of sustained motivational pull. An open-ended qualitative approach was employed to ensure that novel findings could emerge (Johnson & Onwuegbuzie, 2004), helping to address some of the limitations of previous research (Hamari, Koivisto, & Sarsa, 2014). In particular, this study sought to clarify which contextual factors influenced the capacity for the artifactual characteristics of a gamified product to impact the motivational experience of the user, thus exploring the poorly researched concept of "situated affordance" theorised by Deterding (2011) to be a key determinate in gamification outcomes.

Drawing from the insights of Study One, a model of contextual and artifactual motivational affordance in gamification was constructed, incorporating SDT and OIT. Study Two aimed at quantitatively testing this model via an online survey in both a voluntary health context and a workplace productivity context. This development of a quantitative methodology through the incorporation of quantitative findings reflects the synergistic strength of a mixed-methods approach, in which findings derived from one method can inform the development of another (Greene, Caracelli, & Graham, 1989; Hesse-Biber, 2010).

Table 2: Mixed-method research design

Study	Objective	Methods
Study One: Qualitative	To develop an in-depth understanding of the situated affordance impacting the motivation experience of users of gamification products.	*Data Collection:* Semi-structured depth interviews *Sampling:* Convenience Sample *Data Analysis:* Thematic analysis
Study Two: Quantitative	To quantitatively examine the relationship between contextual factors (motivation orientation) on needs satisfaction and use of gamification products in health and workplace environments.	*Data Collection*: Web-based survey *Sampling:* Purposive sampling *Data Analysis:* Structural equation modelling

3.2.3 Study One: Determinants of Consumers' Motivational Experience of Gamification Products

3.2.3.1 Methodology

As outlined in the previous section, Study One sought to explore the contextual factors (situated affordance) that impacted on the motivational experience of users of gamification products. As outlined in Chapter Two, previous research in the broader SDT domain suggested that such extrinsic contextual factors could be classified by their degree of internalisation (see Deci & Ryan, 1985; Deci & Ryan, 2002). However, given the lack of studies investigating these variables in the gamification sphere and the inconsistency of past studies investigating motivation in the gamification context (see Dey & Eden, 2016; Mekler et al., 2017; Sailer et al., 2017), this study aimed to explore such contextual factors inductively.

As such, Study One explored the contextual factors underpinning gamification user's motivation experience through semi-structured depth interviews. This explorative, qualitative approach is consistent with the objectives of this study, given the power of qualitative research to identify contextual issues and provide the richness of detail required to understand novel and complex behavioural phenomena (Atieno, 2009). In particular, by adopting an inductive approach to this explorative research, this study reduces the risk of beginning our study with an inadequate understanding of the research context that may have contributed to the inconsistencies in past gamification studies (Dey & Eden, 2016; Zikmund, Ward, Lowe, & Winzar, 2007). While this study draws from extant SDT theory and conceptions of motivation (Deci & Ryan, 2002), it seeks to explore the personal experience of gamification users to arrive at an "*emic*" understanding of motivation based on the participants' own categories of meaning (Atieno, 2009). Once these contextual factors are identified, their impact of gamification user's motivation outcomes can be discussed and explored, helping to develop and refine a tentative explanatory theory to be tested in further research (Johnson & Onwuegbuzie, 2004).

While there exists a variety of qualitative methodological approaches, in order to develop these emic and participant driven categories of meaning, data regarding the subjective motivational experience of the participants will be collected directly via researcher interaction with the participants (Silverman, 2013; Mays & Pope, 2000).

3.2.3.2 Research Design: Semi-structured depth interviews

Qualitative research approaches encompass a variety of methodological approaches, ranging from ethnographic research conducted through environmental immersion of the researcher as a participant observer through to case study examination of document chains and participant interviews (Creswell, 2007). The two most common qualitative methods used to collect such data are focus groups and depth interviews, with the key difference being the presence of other participants in the interview process for focus groups (Malhotra, 2008). When investigating social constructs, and in particular collective views and the meaning that lies behind such views, the curated group discussion of a focus group setting can provide tremendous insight (Gill et al., 2008). Considering, however, the predominantly individual nature of gamification use (Hamari, Koivisto, & Sarsa, 2014), and the individually subjective nature of motivational experience (Deci & Ryan, 2002), one-on-one depth interviews are the more appropriate methodology for studies of this nature (Silverman, 2013, Mariampolski, 2001).

The use of one-on-one depth interviews is particularly well suited to this research project given the heightened risk of group interviews to predispose respondents to answer questions in such a way as to present themselves favourably, resulting in social desirability bias (Malhotra, 2008; Thomas & Kilmann, 1975). Given the predominance of gamification products targeting such socially conscious behaviours as health and sustainability (Hamari, Koivisto, & Sarsa, 2014), our research is particularly vulnerable to this bias. Even in a one-on-one interview, the interpersonal nature of this methodology may still encourage participants to respond in the most socially desirable fashion (Kaplan et al., 2001; Yin, 2009). While this bias may be similar to the bias inherent in other qualitative research methods such as self-administered questionnaires (Durant & Carey, 2000), mitigating the impact of this bias through triangulation and confirmation by further quantitative methodology is important to ensure the validity of findings (Harrison & Reilly, 2011).

This study was conducted using open-ended semi-structured, rather than rigidly structured interviews (Wengraf, 2001). While rigidly structured interviews can provide incredible comparability of responses, their limited capacity to probe for depth and additional meaning makes them better suited to quantitative rather than qualitative data (DiCicco-Bloom & Crabtree, 2006). Comparatively, unstructured and semi-structured interviews are better

suited to this research project given their ability to co-create meaning with the participant, providing a depth of data required to inform further investigation into the research questions (Crabtree & Miller, 1999). Semi-structured interviews in particular are well suited to this study as prewritten theory driven opening questions can set the theme of the conversation and ensure that critical constructs are explored, without limiting the respondent's capacity to develop their own meanings or codirect the dialog (Patton, 2002). These initial questions, or interview guide, are discussed in further detail below.

Interviews were conducted in person with participants to allow researchers to identify social cues that may be obfuscated when conducting research without a face-to-face component, such as via telephone or email (Mann & Stewart, 2000). These social cues inform the researcher when to probe deeper and provided additional depth and nuance to the data collected, as well as providing additional contextual data in their own right (Irvine, Drew, & Sainsbury, 2013).

3.2.3.3 Participants and purposive sampling design.

Self-reported current and past adult users of voluntary gamification products were interviewed for this study (N=20). These users were from a variety of backgrounds, genders and ages to ensure heterogeneity of participants and maximise external validity (Robinson, 2014). Respondents also reported use of a variety of gamification products ranging from Pokemon Go to Habitica. While limiting the sample to users of a single gamification product would increase the capacity of this study to identify patterns of response to shared artifactual affordance (Deterding, 2011), the study's focus on identifying contextual, situated affordance incentivised the collection of data from users of a variety of gamification products to help identify situated affordances that may not be present in all gamification contexts (Nacke & Deterding, 2017; Hamari, Koivisto, & Sarsa, 2014).

Purposive sampling was used to recruit respondents into the study through social media, physical flyers and personal networks. While probability sampling is generally considered the more robust method of sampling (Lohr, 1999) convenience sampling is better suited to the requirements of this study. As this design was not seeking to achieve statistical generalisation, but rather enhanced contextual understanding, the inherent sampling bias of convenience sampling was less detrimental to validity (Singleton & Straits, 2005).

Additionally, the lack of established sampling frame for our population make non-probability samples significantly more viable (Thomas, Bloor, & Frankland, 2007; Greenwood & Levin, 2006).

3.2.3.4 Instrumentation: Interview guide.

In line with a modified objectivist epistemology, the study used Deci & Ryan's (2002) operationalisation of the external motivation orientations and OIT as the basis for the development of the interview guide. However, in keeping with the value this study has placed on the development of participant derived meaning, the interview questions were worded in such a way to encourage respondents to arrive at their own definitions and understanding (Atieno, 2009). In practical terms this involved the removal of limiting and jargon heavy language and distillation of the research dialect into open and easy to understand questions that would encourage dialog (Wengraf, 2001).

This interview guide was then pilot tested by two participants drawn from the target population, and further modifications were made to the questions on the basis of their feedback. As an example, jargon regarding game mechanics such as user interface were removed and questions focused more on the intent of user actions rather than game design terminology.

The full interview guide is delineated in the following chapter 4, but the interview revolved around two key open-ended questions to explore motivation in gamification product use. These were: (1) "What keeps you using your gamification product?" and (2) "How do you feel when you are using your gamification product?". Probing questions were developed during the interview for the purposes of increasing the detail of responses and to identify the source of motivations discussed and thus facilitate explanations of the described responses as suggested by Schatzman and Strauss (1973).

3.2.3.5 Analysis: Thematic analysis.

Qualitative data analysis was undertaken through a process of thematic analysis and code development through which key themes and patterns present in the collected data were identified and analysed (Boyatzis, 1998). Coding of data reflected a priori SDT and OIT terminology framework where appropriate to incorporate prior theory and thus increase the applicability of research findings to other research contexts while contributing to the

incremental contribution of knowledge in these theoretical contexts (Andersen & Kragh, 2010). Importantly, however, coding was also conducted inductively where theoretical friction or novel themes are identified, to enable themes to emerge directly from the data rather than being limited to preconceived constructs (Thomas, 2006). This synthesis of inductive and deductive coding strategies enables this study to both investigate the importance of extant theory in explaining gamification outcomes and motivation use, while also allowing for novel and potentially disruptive theory to emerge (Fereday & Muir-Cochrane, 2006).

This has the additional benefit of addressing a key limitation of thematic analysis, namely its limited interpretive power beyond description of findings (Braun & Clark, 2006). By nestling the findings of this study in well-established theoretical frameworks such as SDT, conclusions can be justified in light of a broader research context to increase their validity (Galletta, 2013).

3.2.4 Study Two: Consumer perceptions of gamification motivation in Health

3.2.4.1 Methodology

Quantitative research was used in Study Two to examine the proposed model of extrinsic motivation in the form of regulatory styles, impacting on the experience of needs satisfaction, intrinsic motivation, and behavioural intention within a gamification context. Quantitative research is useful in establishing the generalisability of qualitative results (Hesse-Biber, 2010), and so this study seeks to confirm the findings of Study One through incorporating a more robust and externally valid measurement strategy as well as a larger sample size (Zikmund & Babin, 2007). Given the noted differences in responses in Study One between users of gamification products designed to target health behaviours, and products targeting productivity, this study analysed data from two different samples. The first sample was drawn from users of health-related gamification product, while the second was drawn from users of workplace related gamification products.

3.2.4.2 Research Design: Online Survey

Given that this study will seek to measure the extent of a relationship, the data collection method should allow for as large a sample size as possible to best insure that any statistical analysis performed has significant power to reject alternative explanations for any observed

relationships (Everitt, 2002). In pursuit of this objective, self-administered quantitative research has considerable advantages to interviewer directed data collection including reduced social desirability bias (Nederhof, 1985) and efficiency of administration when dealing with large samples (Bernard, 2012).

In particular, online based surveys such as website hosted and emailed surveys boast considerable cost savings, speed of data collection and ease of data recording (Couper, 2000; Ray & Tabor, 2003; Wright, 2005). Comparative to email, web surveys trade the ease of sending for greater control over visual and user interface characteristics (Dillman, 2000). Web based surveys may, however, have issues with attrition and potentially self-selection bias arising from reduced feelings of credibility in online research which may result in differences between samples drawn exclusively from online research (Cole, 2005). Despite this, researchers have argued that web surveys largely provide equivalent results to physical mail-out surveys (e.g.: Deutskens, de Ruyter, & Wetzels, 2006) and even structured phone interviews (e.g.: Ansolabehere & Schaffner, 2014).

For this reason, an online questionnaire was identified as the most efficient method of quantitative data collection considering that both the hypotheses and variables of interest in this study were clearly defined (Sekaran, 2000).

3.2.4.3 Participants and purposive sampling design.

Data was collected from a variety of respondents who self-reported using a gamification product within the last six months. This time limitation was introduced to reduce the impact of recall bias (Raphael, 1987), however it does limit the ability of this study to investigate gamification use cessation. Importantly, to investigate the potential contextual differences identified in Study One, two sample groups were used for data collection. The first group reported using gamification products targeting health behaviour such as exercise, fitness and diet. The second group reported using gamification products that targeted workplace activities such as training, productivity and performance indicator reporting. Purposely collecting data from across these different contexts, coupled with the findings of Study One, suggest that findings may not be equivalent across the two contexts (Hamill, Wilson, & Nisbett, 1980) and therefore data from each context was analysed separately and findings contrasted. Participants from one sample were screened to ensure that they were not also

participants in the other to prevent contamination of the samples. To ensure the greatest generalisability of findings no other selection criteria were employed and variables such as backgrounds, age groups and gendered were recorded in the survey to be used to assess external validity (Robinson, 2014).

Respondents were recruited from the permission-based pre-recruited online consumer panel Amazon Mechanical Turk (MTurk). This represents a non-probability sampling method as members are included in the consumer panel on an opt-in basis, potentially resulting in selection bias (Couper, 2000). However, this type of sampling technique commonly employed in marketing research (Neslin, Novak, Baker, & Hoffman, 2009), and MTurk samples in particular show good equivalence with samples returned by more traditional recruitment strategies (Casler, Bickel, & Hackett, 2013). This non-probability sampling method was practical for this study owing to its speed and timeliness in attracting the large sample size needed to confirm findings with acceptable validity (Evans & Mathur, 2005).

3.2.4.4 Instrumentation: Survey Questionnaire

The study utilised a web-based survey comprising of contextualised versions of three pre-validated scales: the player experience of need satisfaction (PENS) scale (Ryan et al., 2006), the multidimensional work motivation scale (Gagné et al., 2015) and a behavioural intention scale (Cronin, Brady, & Hult, 2000). These scales are widely used in SDT research (Standage, Duda, Treasure, & Prusak, 2003) and so will contribute to the comparability of results across studies. This is important, as extant gamification research has used such a wide variety of instrumentations to assess theoretical determinates, making the drawing of conclusions via meta study difficult (Hamari, Koivisto, & Sarsa, 2014; Nacke & Deterding, 2017).

Each variable was measured using a 7-point Likert scale, weighted from *strongly disagree* to *strongly agree*. Both the order of the scales and the order of items within each scale were randomised to reduce the impact of presentation effects (Murdock, 1968). However, questions from different scales assessing different constructs were kept separate from one another to prevent respondent confusion and its associated threats to reliability (Davis & Venkatesh, 1996).

3.2.4.5 Structural equation modelling.

Structural equation modelling (SEM) was used in Study Two to examine the relationships between extrinsic motivation, needs satisfaction and behavioural intention. This analysis method uses factor analysis and multiple regression tools in combination to estimate the likelihood of causal relationships between variables (Malhotra et al., 2006). Given that this study is informed by the findings of Study One, propositions about the relationships between constructs are already made and thus SEM is an ideal too to test this hypothesised relationship (Raykov & Marcoulides, 2000).

Regression modelling may also be useful in testing proposed relationships, however SEM has the capacity to be used in conjunction with confirmatory factor analysis to reduce measurement error (Marcoulides & Schumacker, 2001). It is additionally capable of testing overall models of variable relationships to establish mediating variables and error terms (Kaplan, 2009; Raykov & Marcoulides, 2000), making it most suitable for addressing the research question.

3.3 Conclusion

This chapter has outlined the research design employed by this thesis. The chapter first justified the research context selected for these studies. Following this, the paradigmatic perspective taken by the research was presented. Next, the research methodology of the three studies within the research design were outlined and justification for the methodology employed discussed. The following two chapters go into further detail as to how each individual study's methods were implemented and operationalised, as all as presenting their results.

Chapter 4: Consumers' Perceptions of Gamification

Following on from Chapter 3, which presented the justification for the research context and design of this thesis, this chapter presents the results of Study One, which aimed to develop an in-depth understanding of consumers' perceptions of gamification services. This chapter is organised in journal article style. Consequently, it presents an introduction and brief literature review justifying this study in Section 4.1 and Section 4.2, followed by the methods it employed in Section 4.3. Last, the chapter provides the results of Study One in Section 4.4, as well as the implications (Section 4.5) and limitations (Section 4.6) specific to those results.

4.1 Introduction

Social marketing faces challenges distinct from those in commercial marketing, arising from the fact that it operates in behavioural contexts such as health promotion, injury prevention, environmental protection and community mobilisation (volunteering) to achieve social good (Lee & Kotler, 2019). An issue common to operating in such contexts is that these settings offer less obvious benefits or require more complex or difficult behaviours to receive benefits, than the typical consumption process within commercial marketing (Parkinson, Schuster, & Russell-Bennett, 2016; Bloom & Novelli, 1981; Rothschild, 1999). These benefits are often poorly understood by consumers (Rothschild, 1999), and commonly require that the targeted behaviour be maintained for long periods before any tangible benefits are received (Hastings, 2007). The net result of these contextual challenges is that the relationship between action and outcome is undermined, significantly reducing behavioural motivation (Thøgersen, 2005).

While technological-based interventions have been touted as a powerful tool to assist in overcoming these contextual limitations (for an overview refer to Section 2.2.1), research has highlighted high rates of attrition across technology-based interventions when compared to physical or face-to-face interventions (Eysenbach, 2005; Patrick et al., 2016). This has been observed in weight loss programs (Neve, Collins, & Morgan, 2010), physical exercise support (Guertler et al., 2015), mental wellness support (Farvolden, Denisoff, Selby, Bagby, & Rudy, 2005) and online depression interventions (Christensen, Griffiths & Jorm, 2004). Eysenbach (2005) suggests that this is the result of the ease by which these services

can be discontinued by users, and thus these interventions face the challenge of continuing to demonstrate a positive exchange through clear links between their use and the participants' well-being and personal benefit. This is in line with the conceptualisation of exchange in social marketing, which specifies that social marketers should offer benefits to the consumers in return for performing the target behaviour (Gordon, McDermott, Stead, & Angus, 2006).

One such technology-based intervention, gamification, has been proposed as having a particularly high capacity to support this positive exchange for consumers, owing to its ability to support intrinsic motivation (enjoyment, fun and interest) through game mechanics (Deterding et al., 2011b). Gamification has delivered successful outcomes across social marketing contexts such as exercise (Hamari & Koivisto, 2013), energy use reduction (Gustafsson, Katzeff, & Band, 2009) and medical education (Pesare, Roselli, Corriero, & Rossano, 2016). However, while research in gamification has typically reported positive outcomes (for a metanalysis see Hamari et al., 2014), mixed and even negative outcomes have also been observed (eg: Hanus & Fox, 2015; Korn & Schmidt, 2015; Mekler et al., 2017; Mitchell et al., 2017).

Establishing the determinates of gamification interventions' success or failure has thus been an emerging area of inquiry in gamification research (Hamari & Koivisto, 2013; Hamari et al., 2014). Indeed, one of the most common criticisms of extant gamification research has been its focus on whether—to the exclusion of how—gamification can modify behaviour (Deterding, 2014; Lewis, Swartz, & Lyons, 2016; Mekler et al., 2017; Seaborn & Fels, 2015). While recent research has focused on specific game mechanics (e.g., points, narrative) to explore their behavioural impact (Nacke & Deterding, 2017), the motivation 'pull' of gamification is a result of both these artifactual (arising from the gamification application, e.g. game design) features and contextual (arising from context being gamified, e.g. presence of social pressure) features (Deterding, 2011). Researchers such as Korn and Schmidt (2015), Mekler et al. (2017) and Mitchell et al. (2017) have thus called for more explorative research into the determinates of gamifications' success or failure across both artifactual and contextual domains.

To address this knowledge gap, this study will explore the impact of the perceptions of users on their motivation to continue or discontinue their use of a gamification application. Specifically, through qualitative interviews, this study seeks to identify both the artifactual and contextual features of a gamification experience that contribute to a user's motivation to continue gamification use, as called for in the literature (e.g., Deterding, 2011, Seaborn & Fels, 2015). Further, it will provide a deeper understanding into the factors contributing to maintaining the use of a technological intervention overtime, a necessary step in improving the use of such services in social marketing (Eysenbach, 2005). Lastly, through analysis of rich qualitative data, this study will capture a broader array of potential behavioural determinates and address the lack of variety in methodology that has contributed to the limited understanding of the mechanisms for gamifications' apparent success (Nacke & Deterding, 2017).

In the following section, a review of current literature pertinent to the study is provided. Next, the methodology of the research is presented. Last, the paper ends with an overview of the results with a discussion of these findings and their theoretical and managerial implications.

4.2 Literature Review

4.2.1 Gamification in social marketing

A key turning point in the study of gamification was a meta-analysis conducted by Hamari, Koivisto, and Sarsa (2014) that employed a modified concept matrix to analyse the outcomes of twenty-four gamification studies across several contexts. They found that in the majority of studies, gamification was able to achieve positive results (predominantly behavioural change or behavioural intention change) for most of the outcomes studied, with no study they reviewed producing entirely non-significant results. Examples of studies analysed include Gustafasson, Katzeff, and Bang's (2009) study into the use of a gamified energy saving application in encouraging reductions in household energy use. They found that use of the app across six energy saving 'missions' resulted in an average reduction of between 15.7% kWh and 28.8% kWh between the two teams. Successful gamification outcomes were also achieved in exercise contexts (Hamari & Koivisto, 2013), encouraging innovation (Jung, Schneider, & Valacich, 2010), and incentivising data gathering (Downes-Le Guin, Baker,

Mechling, & Ruylea, 2012) amongst others. The success of these programs in a variety of contexts, including social marketing contexts such as health, highlights the potential of gamification as a behaviour change tool in social marketing.

Critically, however, in many of the studies examined by Hamari, Koivisto, and Sarsa (2014), not all measured outcomes returned positive results. Halan, Rossen, Cendan, and Lok (2010) demonstrated that a gamified program to encourage the crowdsourced production of educational materials could increase the quantity of such materials, but the desire to maximise scores resulted in contributions of diminished quality. Farzan et al. (2008) reported that the initial increases in user activity following the introduction of gameplay mechanics to a company's internal social networking system quickly diminished over time and dropped below starting level after it was removed. Farzan and Brusilovsky (2011) reported that the increase in user participation in their gamified course recommendation system had the unexpected impact of increasing positive rating bias.

A major finding of Hamari et al.'s (2014) review was that the limited focus on theory in previous studies hampered the ability of research to arrive at well supported conclusions as to what was causing this variety of outcomes. As further research built upon this work, the emerging focus of gamification research has thus been on exploring theory driven explanations for gamification's success or failure (Deterding, 2014; Lewis, Swartz, & Lyons, 2016; Mekler et al., 2017; Seaborn & Fels, 2015). Addressing this gap is critical, as without a clear consensus on *how* gamification works, it is difficult to make recommendations as to where it is best utilised, or how it might be more effectively deployed (Lewis, Swartz, & Lyons, 2016).

In addressing this limitation of extant research, several theoretical lenses have been adopted by various researchers. Drawing from research into positive psychology, some researchers have explored the capacity of gamification to bring about a 'flow state' in which an activity becomes fully immersive and engaging (Hamari & Koivisto, 2013). Others have explored concepts such as escapism, suggesting that gamification may appeal to users through making the targeted behaviour different and novel (Przybylski, Weinstein, Ryan, & Rigby, 2009). In many cases, theories in gamification research have been explored primarily because of their use in extant voluntary video game studies (Nacke & Deterding, 2017). In

practice, however, gamification refers to the use of game design mechanics (such as points, leaderboards and badges) rather than the creation of fully-fledged games (see Chapter 2.2 for an overview on this distinction). Due to this, the most common way that researchers examine the determinates of gamification outcomes, is through exploration of the motivational affordance provided by the various game mechanics that make up a gamification intervention (Hamari, 2017).

Motivational affordance refers to the actionable properties of an object that determine whether and how it can support the motivation of an actor interacting with that object (Gibson, 1979, as referenced by Norman, 1999, p. 39). The use of this term in gamification research largely stems from its use in human-computer interaction research in which specific mechanics of computer systems, such as user interface, were examined to determine their overall impact on user motivations to continue their use of that system (Zhang, 2008). In a gamification context, this is commonly understood as the application of identified sources of video games' motivational affordance (typically game design mechanics such as point scoring) to increase the motivational pull of the target behaviour (Deterding et al., 2011a).

4.2.2 Motivational affordance and self-determination theory.

While motivational affordance offers a useful taxonomy for gamification researchers, it does not in and of itself explain why particular design mechanics seem to exert a motivational 'pull' (Nacke & Deterding, 2017). Therefore, motivational affordance is commonly discussed through the lens of Self-Determination Theory (SDT) (Hamari et, al., 2014). This macro theory of human behaviour proposes that humans are intrinsically drawn towards activities that can satisfy their need to feel competence (to control outcomes and experience mastery), relatedness (to have connection to others) and autonomy (to have causal agency) (Deci & Ryan, 1980). Ryan, Rigby, and Przybylski (2006) used this conceptualisation of motivation to propose that this intrinsic motivational pull toward needs satisfaction was the driver of video game engagement. It is this intrinsic motivational model of video game engagement that has informed much of the current research into what constitutes motivational affordance in gamification (Deterding et al., 2011b).

Given the demonstrated ability of video game mechanics to facilitate needs satisfaction and drive intrinsic motivation (Cruz, Hanus, & Fox, 2015; Ryan, Rigby, & Przybylski 2006), it has

been proposed that the motivational affordance of gamification arises from the use of game mechanics to create intrinsically motivating gameful play (see Flatla et al., 2011; Zichermann & Cunningham, 2011). Game mechanics such as points, leaderboards and badges have been argued to increase intrinsic motivation through satisfaction of the competence need via engaging feedback (Hamri & Eranti, 2011; Hamari et, al., 2014; Lyons, 2015). Additionally, through mechanics such as player choice, narrative and roleplay, relatedness and autonomy needs can also be satisfied (Deterding et al., 2011b; Nicholson, 2012). However, while such mechanics have been demonstrated to have intrinsic appeal in the aforementioned research into commercial video games, research into their role in gamification has been mixed.

Sailer et al. (2017) found that game design mechanics resulted in competency and relatedness needs satisfaction, but not autonomy needs satisfaction. In contrast, Mekler et al. (2017) found that although the addition of performance features resulted in increased performance on an image annotation task, it had no impact on competency needs satisfaction or intrinsic motivation. While Mitchell et al. (2017) did not examine psychological needs satisfaction, they found that even though the use of a gamified fitness application increased exercise, it had no impact on intrinsic motivation. Interestingly, Hanus and Fox (2015) found that in a classroom environment, gamification may actually undermine autonomy needs satisfaction resulting in a decrease in both intrinsic motivation and behavioural outcomes.

Researchers have argued that this range of results observed indicates that there remains scope for improved understanding of this domain. Specifically, researchers suggest that contextual factors may influence how game mechanics are interpreted by users and thus influence their motivational outcomes (e.g., Korn & Schmidt, 2015; Mekler et al., 2017; Mitchell et al., 2017). This conclusion reflects the work of Deterding (2011) in proposing that motivational affordance is both a property of the specific game mechanics employed by the gamification intervention (termed artefactual affordance), but also a property of the context being gamified itself (termed situated affordance). A key component of the proposition made by Deterding (2011) is that the transfer of game mechanics to a non-game context will not necessarily lead to the same motivation affordances being experienced as within a game context. Deterding (2011) argues that the non-game context comes with its own motivationally salient features (such as social pressure, pre-established

rewards/punishments, and pre-conceived perspectives on the target behaviour) that will shape the usage, meaning and therefore motivational affordances of the gamification intervention itself.

It is a well-established component of SDT that in addition to the intrinsic motivational 'pull' towards the satisfaction of psychological needs, motivation is also influenced by the environment in ways analogous to Deterding's (2011) conceptualization of situated affordance (Deci & Ryan, 2002). This motivation that exists outside of an individual is termed extrinsic motivation and is commonly derived from the consequences of behaviour, such as rewards, punishments, or social pressure (Ryan & Deci, 2000). Extrinsic motivation typically negatively impacts on intrinsic motivation (Deci & Ryan, 2002) through a process often referred to as '*Motivation Crowding'* or '*The Overjustification Effect*' (Carlson, Neil, & Donald, 2007; Ogilvie & Prior, 1982). This has implications for the use of gamification in social marketing contexts, as these contexts are often lacking in intrinsic motivation pull and commonly regulated by extrinsic motivation (Bloom & Novelli, 1981; Rothschild, 1999; Thøgersen, 2005).

Despite the important effect context may have on the interpretation of gamification results, and how common discussion of intrinsic and extrinsic motivation is in the gamification literature, studies that empirically investigate the role of context remain scarce (Seaborn & Fels, 2015). Given the importance of understanding the motivational experience of users in predicating both gamification outcomes (Dey & Eden, 2016) and social marketing outcomes (Binney, Hall, & Oppenheim, 2006), it is necessary to examine this relationship between artefactual and contextual motivation affordance in greater depth. In particular, it would address the limited extant research into the role of extrinsic motivation in social marketing interventions (Hagger et al., 2014) and better inform the use of gamification as a technological intervention within social marketing as called for by the literature (Mitchell et al., 2017). This study seeks to address this research gap by investigating through qualitative interviews the relationships between artefactual and contextual motivational affordance and the experience of gamification outcomes.

4.3 Methodology

4.3.1 Research context

As previously mentioned, many socially beneficial behaviours targeted by social marketers are innately less attractive to consumers (Dibb & Carrigan, 2013; Hastings, 2003, 2007). Given that context may play an important role in influencing the outcomes of gamification (Deterding, 2011; Hamari, Koivisto, & Sarsa, 2014), the findings of gamification research conducted in other contexts may not be transferable to social marketing. Therefore, it is important to operationalise this study in a context relative to social marketing. The study was thus conducted within the context of personal fitness. While improvements have been made in the 10-year trends of smoking and alcohol abuse, decreases in physical activity as the result of increasing sedentary lifestyles continue to present a health concern with 63% of Australians aged 18 and over classified as overweight or obese (AIHW, 2018). Typical social marketing interventions in this context have been troubled by high attrition rates when not supervised (Wilson & Brookfield, 2009), and prohibitive costs and minimal benefits after implementation when the intervention is supervised (Cox, Burke, Gorely, Beilin, & Puddey, 2003; Shephard, 1992). Overcoming these limitations through the use of innovative digital technology such as gamification has been a focus of social marketers (Lee & Kotler, 2019).

4.3.2 Depth interviews

To examine consumer perspectives on artefactual and contextual motivational affordance in gamification, semi-structured depth interviews were conducted with volunteers at neutral ‘third-place’ locations such as cafes and public parks (Oldenburg, 1999). Given the difficulties that past research has had in determining the specific sources of motivational affordance in gamification contexts (Dey & Eden, 2016), and the lack of prior research into behavioural determinates in gamification undertaken from a consumer perspective, an explorative research design is well suited to clarify the area of inquiry (Creswell 2007). Qualitative research methodology is particularly advantageous in this situation given the richness of this data collection method lending itself well to the inductive development and refining of theory (Johnson & Onwuegbuzie, 2004). Given the limitations of extant theory in explaining observed gamification outcomes, an inductive expansion of theory is warranted (Nacke & Deterding, 2017). Moreover, since this study seeks to improve understanding of a

behavioural event from the consumer's perspective, data regarding the subjective motivational experience of the participants was collected directly via researcher interaction with the participants (Silverman, 2013; Mays & Pope, 2000).

When investigating social constructs, particularly collective views and the meaning that lies behind such views, the curated group discussion of a focus group setting can provide tremendous insight (Gill et al., 2008). However, since this research investigates the experiences and motivations of individuals on the specific matter of their own subjective experience with gamification, individual interviews were more appropriate (Silverman, 2013; Mariampolski, 2001). The use of individual interviews is particularly well suited to this research project given the potential for embarrassment of participants who would be discussing their personal motivation toward health behaviours such as personal fitness (Sethna & Blythe, 2016), preventing open discussion in a focus group setting (Malhotra, 2008).

Specifically, semi-structured individual interviews were employed as the use of extant theory, SDT, to inform this study enabled questions to be written ahead of time (Patton, 2002). Questions therefore reflected the SDT motivational constructs being investigated to better inform further research, but with the freedom to diverge and investigate other relevant motivators and experiences reported by the participants. Additionally, while new technology has provided new interview options to researchers, conducting research without a face-to-face component such as via telephone or email potentially obfuscates important social cues that can inform the researcher when to probe deeper (Mann & Stewart, 2000). Owing to this, as well as the greater ease of building rapport face-to-face (Irvine, Drew & Sainsbury, 2013), this study was conducted using face-to-face semi-structured interviews.

Interviews began with a general discussion that included several icebreaker questions relating to the fitness related gamification application being used by the participant. Beginning the interview with light and general discussion helps to build rapport and breaks down any perceptions of power imbalance between the participant and the interviewee, which can help to decrease response bias (Patton, 1990). This was then followed by a semi-structured interview that adhered to the interview protocol outlined below. Participants were voluntary, and the interviews they provided were audio recorded and ranged between

20 to 70 minutes in duration, averaging 50 minutes in length. Interview length is largely dependent on the questions needing to be asked by the interviewer, but this duration is sufficient to explore the topic in detail without overly straining the participant or denying them the capacity to elaborate if they wish (Kvale, 2008).

4.3.3 Development of interview protocol

The use of an interview guide in semi-structured interviews helps to ensure the completeness of data and comparability of responses by ensuring participants answer the same questions while still allowing the interviewer the flexibility to explore responses in more detail (Patton, 2002). Each question is worded openly and phrased in a non-directive manner to encourage the participant to co-create meaning and express their own subjective experience with their own terminology (Turner, 2010). This reflects the purpose of this research to explore new theoretical avenues. Some of the questions, however, were informed by SDT and explore key motivational constructs including the different levels of regulation in extrinsic motivation proposed by *organismic integration theory (*OIT) (Deci & Ryan, 1985). The questions are written is such a way that the researcher can probe for this meaning, rather than closed questions that demand a particular answer. In this way the participant can tell their own story in a non-directive manner (McCracken; 1988), while still enabling the study to be nested in existing gamification research.

4.3.4 Sample description

This research used purposive sampling of a target population of self-reported current and past users of fitness related gamified apps. The sample included both males and females and drew upon participants from a variety of backgrounds and age groups to ensure heterogeneity of participants and maximise external validity (Robinson, 2014). Data collection continued until data saturation has been reached, when no new themes emerged and the coding categories showed sufficient dimensional depth, with a total number of 20 interviews (Dworkin, 2012).

Participants volunteered for the study through social media, physical flyers and personal networks. A short briefing was subsequently conducted in person by the researcher verbally covering the purpose of the interviews, the voluntary consent details, and the use of recording devices, as well as soliciting any questions from the participant prior to the

interview to ensure informed consent of the participants (Flory & Emanuel, 2004). Participants were then invited to provide written consent via the written consent form.

4.3.5 Analytical procedure

In preparation for analysis, the recorded interview audio was transcribed via contractors sourced via Amazon's mTurk service and checked against the original recording by the interviewer to ensure the accuracy of the transcription. The recorded transcript then undertook a process of thematic through which key themes and patterns present in the collected data could be identified and analysed (Boyatzis, 1998). Coding of data reflected *a priori* SDT terminology where appropriate to incorporate prior theory and thus increase the applicability of research findings to other research contexts while contributing to the incremental accretion of knowledge in these theoretical contexts (Andersen & Kragh, 2010). Importantly, however, coding was also conducted inductively where theoretical friction or novel themes were identified, to enable themes to emerge directly from the data rather than being limited to preconceived constructs (Thomas, 2006). This synthesis of inductive and deductive coding strategies enables this study to both investigate the importance of extant theory in explaining gamification outcomes and motivation, while also allowing for novel and potentially disruptive theory to emerge (Fereday & Muir-Cochrane, 2006).

Coding was undertaken via cycles, in accordance with the recommendations of Braun and Clarke (2006), to ensure that coding both accurately reflected the emergent themes within the interviews and provided clear links to extant research. The first (or open) cycle focused on identifying key themes that emerged *in vivo* from the words of the participants themselves. This was then followed by pattern coding that sought to reduce these initial codes down into their categories of shared meaning. Provisional coding was then undertaken on the basis of extant SDT constructs, with open and axial coding later employed to expand the dimensions of these SDT constructs and investigate their conditions and causes.

As this research was conducted individually by the researcher, the commonly recommended inter-rater reliability checks (used to help establish a consensus view of coding) was not utilised, limiting test validity (Marks & Yardley, 2004). Nonetheless, this threat to validity was minimised through clarifying content check questions to confirm the interviewer's

interpretation of the participants' statements at the end of the interview, providing a "reality check" and ensuring that coding was informed by the intent of the participants (Saldana, 2009). Coding was performed manually by the researcher in QSR NVivo 12, a qualitative data management tool.

4.4 Findings and Discussion

The following section outlines the characteristics of the sample obtained, followed by the presentation of the key themes that emerged from the qualitative interviews. Each theme is grouped into the umbrella categories of gamification outcomes, artifactual affordance and situated affordance. Themes and these umbrella categories are outlined in the table 3 below. Discussions of these themes are related to the extant literature, and key quotes from the participants regarding these themes are provided in the following format: *"Quote" (Gender [M/F/O], Participant Number, App Name).*

Table 3: Qualitative themes and Categories

Gamification Outcomes		**Artifactual Affordance**		**Situated Affordance**	
Theme	**Description**	**Theme**	**Description**	**Theme**	**Description**
Targeted behavioural improvement	Changes to behaviour targeted by the app	Novelty	Motivation arising from perceived novelty	External regulation	Motivation arising from external rewards and punishments
App maintenance of attrition	Changes to motivation to continue/ discontinue use of the app	Competency affordance	Motivation arising from satisfaction of need for challenge and mastery	Introjected regulation	Motivation arising from guilt and social pressure
		Relatedness affordance	Motivation arising from satisfaction of need for meaning and connection	Identified regulation	Motivation arising from identified utility and goal congruence
		Autonomy affordance	Motivation arising from satisfaction of need for control and agency	Integrated regulation	Motivation arising from identity and core value congruence
				Amotivation	Lack of, or reduction in motivation

4.4.1 Sample characteristics

Of the 20 participants interviewed, the majority (n=14) reported ongoing use of a gamification application. The age of these participants ranged from 18 to 55 years old (Mean: 27.8, SD: 7.7) (See Table 4). Participants reported a wide range of occupations, however, the most common were student (n=4) and hospitality (n=4). The most commonly used gamification application in the sample was Pokémon Go (n=11), followed by Fitocracy (n=2). All other applications were used by a single participant only.

The frequency of Pokémon Go in the sample is proposed to be because of the immense popularity of the application, and the proximity of data gathering to its launch. Within three months, Pokémon Go had been downloaded over 500 million times worldwide and was the fastest game to make over $500 million in revenue (Perez, 2019). In Pokémon Go players physically move through the real world to collect, upgrade and battle virtual pet 'Pokémon', utilising augmented reality features through their mobile phone. As this augmented reality necessitates physical activity to achieve game objectives, it indirectly supports exercise outcomes. Its use has been shown to improve physical fitness, particularly among those who engaged in limited exercise before using the app (Wong, 2017). Fitocracy in comparison is directly targeted at promoting physical activity through virtual rewards and feedback for exercise activity tracked though the user's phone.

Table 4: Profile of participants

Participant Number	Age	Gender	Occupation	App Name	Continued/ Discontinued
1	23	Female	Pet Sitter	Pokémon Go	Continued
2	55	Female	Investment	Pokémon Go	Continued
3	28	Male	Hospitality	Pokémon Go	Continued
4	21	Male	Student	Pokémon Go	Continued
5	32	Male	Marketing	Pokémon Go	Continued
6	25	Male	Police	Fog of World	Continued
7	35	Male	Student	Pokémon Go	Discontinued
8	29	Female	Nurse	The Walk	Discontinued
9	23	Female	Hospitality	Pokémon Go	Continued
10	25	Male	Marketing	Fitbit	Continued
11	26	Male	HR	Zombies Run	Discontinued
12	25	Female	Carer	Pokémon Go	Discontinued
13	27	Male	Hospitality	Pokémon Go	Continued
14	30	Male	Labourer	Fitocracy	Continued
15	28	Female	Personal Trainer	PT in My Pocket	Continued
16	29	Male	Engineer	Strava	Continued
17	25	Female	Student	Fitocracy	Continued
18	32	Female	Doctor	Map My Fitness	Discontinued
19	18	Female	Hospitality	Pokémon Go	Discontinued
20	20	Female	Student	Pokémon Go	Continued

4.4.2 Gamification outcomes

4.4.2.1 Targeted behavioural improvement

Among app users there was a majority view that using the gamified apps resulted in an increase in the behaviour that the app targeted. Interestingly, however, many users of gamified apps noted that they did not have a behavioural goal in mind when they started using the app, and that the behaviour change they experienced was incidental:

> *"I've never really thought of using it to get myself outside, but now that I am using it, I've noticed, I am going outside." (M, 6, Fog of World)*

> *"I didn't really have a fitness goal, I was mostly checking [the app] out because I was curious … I do find myself going for longer walks now because of it." (F, 2, Pokémon Go)*

This result indicates the capacity of gamification to achieve behavioural change even amongst those lacking an initial motivation pull towards behaviour change, an important hurdle to overcome in social marketing (Dibb & Carrigan, 2013; Hastings, 2003, 2007). It is interesting that many of the participants indicated that the behavioural outcomes of their use of gamification were not related to a personal fitness goal, as previous research has highlighted that much of consumers' behaviour towards technology is goal driven (Bagozzi, 2007). This is reflected in comments made by the participants that they often had entertainment, rather than a behavioural goal, in mind when they started using the gamified app:

> *"I thought: Oh, that sounds fun. I'd like to see what that's about. Because that's something really new." (F, 2, Pokémon Go)*

> *"It looked really interesting, the idea sounded fun, I thought why not?" (M, 11, Zombies Run)*

This may be explained by the fact that many of the most popular gamified apps that are offered commercially, such as Pokémon Go, are sold as entertainment rather than exercise products (Petite, 2017). While these non-social marketing relevant goals are often in competition for resources and would typically inhibit the behaviour being targeted by social marketers (Schuster, 2015), the findings highlight the capacity for gamification to turn this

pursuit of entertainment into complementary rather than competing goal.

Amongst the users that both started app use with a fitness goal in mind and felt as though they had seen an increase in the targeted behaviour, there was a view that the app was key to realising their behavioural goals:

> *"[The app] helped for sure, it is always suggesting new things to try … keeps you motivated" (M, 14, Fitocracy)*

The continued use of the app in cases involving a goal external to the app itself (namely a fitness goal) was contingent upon the perceived utility of the app. This is consistent with a sub-theory of SDT, organismic integration theory (OIT) (Deci & Ryan, 1985), in which behaviour conducted in pursuit of an extrinsic motivation (in this case the use of an app to pursue a fitness goal) becomes autonomous when it is consciously valued as useful or personally important.

4.4.2.2 App maintenance or attrition

Participants in the study included both individuals who were currently using a gamified app (n=14) and those who had used gamified app but were no longer using it (n=6). When describing their reasons for ceasing use of the app, participants often reported a lack of intrinsic motivation to continue using the app:

> *"It just wasn't what I wanted, it sorted my nostalgia fix for Pokémon, but I didn't find the actual app itself any fun" (F 12, Pokémon Go)*

> *"It [reason for ceasing use] was just a matter of fun … I started finding it really boring" (F, 19, Pokémon Go)*

Conversely, it was commonly stated by participants who continued to use their gamified app that it was the app's capacity to support intrinsic motivation that was the major determinant of their ongoing use.

> *"It makes the walking more interesting, it gives you something fun to do while you are out and about" (F, 1, Pokémon Go)*

> *"It is just a bit of fun really, I enjoy using and seeing where I have been" (M, 6, fog of world)*

That participants indicated that intrinsic motivation was important to continued use of gamified apps is not surprising, given the centrality of intrinsic motivation to behavioural adherence (Deci & Ryan, 2002) as well as the findings of previous gamification research (e.g., Pe-Than et al., 2014; Peng et al., 2012; Ryan et al., 2006).

Interestingly one participant indicated a lack of specific motivation towards app use, indicating that their use had become habitual.

> *"I would think about it [ceasing app use] but I don't think I would go through with it. It has almost become a habit, I have played it for so long." (M, 3, Pokémon Go)*

Habitual use of video games has been of increasing concern to researchers, given the increased prevalence of the hobby (Brand, Todhunter, & Jervis, 2017), the increasing use of habit-forming gambling mechanics such as loot boxes in video games (Macey & Hamari, 2019), as well as the introduction of a behavioural addiction category of the American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders (DSM-5) (Petry & O'Brien, 2013). While some researchers have raised the ethical issue of habit formation within gamification literature previously (e.g. Bogost, 2013; Kim & Werbach, 2016), empirical investigation of this dimension remains scarce. However, it is also likely that this response indicates the presence of behavioural inertia, a model of consumer behaviour that suggests that in the absence of a compelling reason to change (including terminate) a behaviour, consumers will continue to engage in that behaviour (Amine, 1998). Investigating the habituation of gamified app use, and its potential ethical implications and capacity for harm, may therefore be important in future research (Kim & Werbach, 2016).

Habitual behaviour to one side, the participants were clear in their indication that motivational experience, and particularly the presence or absence of intrinsic motivation, was the primary factor that underpinned their decision to continue use of the gamified app or not. There was, however, a variety of suggestions as to what contributed to the presence or absence of this intrinsic motivation. The following section delineates the participant's perceptions of the elements of motivational affordance in gamification, separated into

artefactual (arising from features of the gamified app) and contextual (arising from features of the environment being gamified) sources of affordance, as suggested by Deterding (2011).

4.4.3 Artefactual affordance

Deterding (2011) defines artefactual affordance as the features of an object that allow the user to experience the satisfaction of their motivational needs when interacting with the object. In our study, participants highlighted a number of game mechanics that both supported and thwarted the satisfaction of their motivational needs. They are outlined below, separated into broad categories that reflect STD conceptualisations of these needs (*Deci & Ryan, 2002).*

4.4.3.1 Novelty

Commonly, participants highlighted the positive capacity for a gamified app to make otherwise disinteresting tasks more engaging through the addition of novel *content:*

> *"It is otherwise the same old thing every day so I guess it just provides me with an element of something different in my day." (F, 2, Pokémon Go)*

> *"It is like you are off on an adventure, you will end up in these really interesting situations that you otherwise would just miss out on" (M, 3, Pokemon Go)*

To many users, the gamified app's capacity to satisfy their need for novelty over time was very important, with users becoming unsatisfied if their app did not receive frequent updates:

> *"I liked that they changed it up a bit and brought in things like the, you know, special events where more Pokémon were available at times, and do things to kind of bring some life back into the game" (M, 4, Pokémon Go)*

> *"I think [I would stop] if I had explored all the goals of things to do. Like, if I maxed out my character, if I caught all the Pokémon, if I had all the medals, I think if I had a look on the internet and if nothing else was released, I think I would stop." (M, 3, Pokémon Go)*

While SDT does not typically consider novelty a true psychological need, researchers such as González-Cutre et al. (2016) have argued that the need for novelty reflects the innate human

desire to seek out new experiences, and that without the experience of novelty, people do not truly thrive. This is still very much an ongoing area of debate within SDT, with other researchers arguing that novelty is best considered a component of autonomy (Ryan & Deci, 2000).

4.4.3.2 Competency supportive/thwarting affordance

While most participants reported satisfaction with their capacity to feel competent at using the app, for those who struggled the result was a substantial hit to their motivation to keep using their gamified app:

> *"I would get frustrated when I couldn't get at it (the data that I needed). It was annoying because I knew what I wanted it to do but I struggled to make it work how I wanted." (F, 18, Map My Fitness)*

It is to avoid this sort of frustration and potential for attrition that user design has been pushed to the forefront of human-computer interaction (HCI) discussions (Card, 2018). This focus on user experience is observed in non-gamification contexts through the tailoring of user interfaces to the needs of the user via touch-based user interfaces of elderly users (Dodd, Athauda, & Adam, 2017), or a focus on visual cues over text menus when designing for adolescents (Wozney, Baxter, & Newton, 2015). The negative reactions of users to the usability of their gamified apps suggests that social marketers should also consider usability studies to facilitate the ease of use of their design to ensure that competency satisfaction is not undermined.

In addition to features that supported competency needs satisfaction with reference to using the app itself, participants also highlighted the capacity for gamification to support competency needs satisfaction for the behaviours targeted. Participants reported that the feedback they received from the app helped to reinforce the progress they were making in the real world:

> *"The best bit is when you get a new PB (personal best), it does a little celebration thing. It is just nice to get that immediate feedback." (F, 15, PT in My Pocket)*

"The whole way, it tells you what you're doing per kilometre, when you're at halfway, those sorts of things, and then at the end it gives you a pep talk and those sorts of things, so it like really helps you with the exercise." (M, 6, fog of world)

The capacity for gamification to support competency needs satisfaction through visual feedback has long been the central argument for gamification's efficacy (Hamari, 2013; Pavlas, 2010; Zichermann & Cunningham, 2011). It is because of this that even relatively simple gamification such as points leaderboards and badges have been proposed as potentially powerful ways to magnify needs satisfaction (Zichermann & Cunninghan, 2011).

However, not all reactions to informational feedback was positive, with several participants indicating dissatisfaction with the virtual rewards on offer:

"I don't really care about the badges, you kinda just get them for everything. I really just set my own goals" (M, 10, Fitbit)

This feedback reflects warnings in SDT research regarding the use of virtual rewards: when rewards or feedback offered are not in line with the users own personal goals and values, such feedback can actually undermine needs satisfaction by trivialising effort (Deci & Ryan, 2002). Conversely, by aligning feedback to increase its relevance to your audience, you increase the positive impact this feedback can have on motivational experience. The study findings reflect this notion, with feedback best received when it was directly relevant to the user's own goals and interests:

"So my accomplishment is more personal, it's not really a badge or anything in there, but I love seeing that I have accomplished a whole block, a whole grid, compared to actually levelling up with the points." (M, 6, Fog of World)

"I have always loved Pokémon, so I tended to get fixated on it, when I am going to a place I automatically think, cool I can catch Pokémon there." (M, 3, Pokémon Go)

4.4.3.3 Relatedness supportive/thwarting affordance

One of the most common factors that supported gamified app use identified by participants was the presence of friends or family who were also active users of the app:

> *"I guess the main thing that appeals to me is just the competitive side to it all, showing that you're better than your mates, and enjoying that kind of aspect of challenging each other" (M, 4, Pokemon Go).*

The impact of salient reference groups such as these have been well documented in the SDT literature as having a critical role on the experiences of relatedness needs satisfaction through amplifying feelings of connection and caring (Deci & Vansteenkiste, 2004).

While most participants considered the use of the same gamified app by their friends and family a positive feature, when asked there was a split in participants who thought that their enjoyment of the gamified app was dependent on their presence:

> *"It is fun to be able to talk about it, but I think I would just keep playing [if my friends stopped]. It is just sort of something I do on my own anyway". (M, 13, Pokemon Go).*

> *"I don't know [if I would stop if my friend stopped]. He'd probably have to stop playing it for me to figure that out. I might though, I do think that I get a kick out of the healthy competition." (M, 6, Fog of World)*

For those who had experienced having friends and family cease their use of the gamified app, the result was typically a loss of feelings of relatedness which resulted in diminished intrinsic motivation.

> *"The app being continually motivating with this competitive aspect is something that went away totally when you knew that people that you knew in the real world had stopped playing." (M, 7, Pokemon Go)*

While existing friends are a definite advantage in the experience of relatedness needs satisfaction, SDT suggests that they should not be necessary if the motivation affordances are there to support its satisfaction (Deci & Ryan, 2002). Indeed, many of the gamified apps discussed by participants were rich in features that sought to connect users of the app with one another to build communities. Responses to these features, particularly social media features, were mixed, however, with some users reporting that sharing their progress in the app was a positive experience, while others expressed disinterest or even negativity toward having their progression in the gamified app being shared publicly.

"I really like the ability to share your journey through Facebook and Insta, particularly if you have just done something really big and want to celebrate." (M, 16, Strava)

"I know that those features [social media] were there, but I honestly didn't even notice them. I don't really care about that stuff" (M, 11, Zombies Run)

"[The worst bit was] the gyms, definitely. Not only was it really boring, but you would see these people who had been playing from the start with unbeatable Pokémon … I just wanted to play it on my own." (F, 19, Pokémon Go)

Previous research into video games suggests that player type can influence the perception of leaderboard style features that compare your progress with other users (Huotari & Hamari, 2012; Yee, 2006). Individuals who are more competitive may find these features supportive of their sense of competence by presenting a challenge to be overcome, others who are more co-operative may find these features supporting their relatedness needs by allowing them to share their progress with others. However, individuals who are more focused on individual progression may find these features disheartening, particularly when comparing their progress to players who possess advantages from longer play time or mechanical skill that are hard to overcome. That player type seems to be impacting on the experience of artefactual affordance in gamification suggests that this is a concept deserving of future research.

4.4.3.4 Autonomy supportive/thwarting affordance

Participants often remarked on the importance of user choice and control to their enjoyment of a gamified app. Sometimes this was expressed as a desire to have meaningful choices regarding how you wanted to use the product:

"I really like the amount of options that you have, like it does just about anything you would want it to do. So you can kind of just use it to track the program that you are doing, you don't have to work around it." (F, 15, PT in My Pocket)

This was particularly apparent when discussing fitness apps with the ability to customise user-specific goals and difficulty.

> *"I was actually a bit worried before I started, you know, the app is called zombies Run and I am not so into running. So it was good to have control over that aspect of it [variable difficulty]." (M, 11, Zombies Run)*

> *"You have a lot of control over it [the app], like you can set your own routines and stuff." (M, 14, Fitocracy)*

Conversely, amotivation arose owing to frustration and diminished intrinsic motivation where users were unable to use the app in the way they desired. In particular, being forced to engage in game mechanics that created perceived barriers between the user and their desired outcome seems to provoke the greatest negative response as illustrated by the following extracts:

> *"I find it very annoying that the Pokéstops are in parks and things. There is a hill near my place that I like to climb, but it doesn't have any Pokémon so there isn't much point using the app." (M, 7, Pokémon Go).*

> *"I hated that all the good ones [Pokémon] are all region locked, like in different countries and stuff. So even though I wanted to go out and look for them, I literally couldn't. (F, 19, Pokémon Go)*

This finding is in line with previous research that highlights the importance of perceived user control to feelings of autonomy and ultimately intrinsic motivation *(*Pe-Than et al., 2014; Peng et al., 2012). Frederick and Ryan (1995) suggest that features that facilitate an internal perceived locus of causality (perceived individual control over outcomes), such as freedom of choice or informational aspects that show a behaviour's effect on outcomes, will help to satisfy autonomy needs and thus also facilitate intrinsic motivation (Frederick & Ryan, 1995). Conversely, features that reduce a user's feeling of control over the app diminish intrinsic motivation (Pe-Than et al., 2014). That this pattern of responses was primarily reported by participants that discontinued app use suggests that this loss of control and diminished intrinsic motivation arising from artefactual affordances undermines behavioural motivation. This was also observed in unintentional artefactual affordances, arising from bugs and mechanical errors, resulting in the app behaving in unexpected and uncontrollable ways:

> *"The main thing [that caused me to stop using the app] was that it just froze up one day and deleted an afternoons worth of data. That wasn't a big deal I guess, but it was frustrating enough I decided that enough was enough." (F, 18, Map My Fitness)*

Further sources of unintentional artefactual affordance arose from the physical limitations of the hardware platforms used to distribute the gamified apps. Issues such as the impact on mobile battery life of excessive GPS tracking, streaming of data and intensive screen and camera use were reported to undermine feelings of control resulting in frustration and diminished intrinsic motivation.

> *"Yeah, well, when you need the phone for other things, or if you are working in the morning, and you want to turn it on and play for a couple of hours, then you need your phone for the rest of the day, it's just not going to happen." (M, 6, Fog of World)*

> *"I turn that feature off. When you're an adult playing it, you're more concerned about your battery life than you are about it (seeing the Pokémon on the screen) (M, 4, Pokémon Go).*

An interesting observation was made regarding mixed responses to the level of interaction allowed for in the gamified app. Interactivity is generally thought of as the capacity for an object to respond to a user's input (Parsons & Sedig, 2014), and so this would suggest that mechanics that reinforce that capacity of the user to change and interact with the gamified apps will make for more intrinsically motivating gamified apps. Indeed, for the majority of users, interactivity was considered to be a very desirable feature and was associated with intrinsic motivation.

> *"The game I prefer would be Pokémon mostly because it's more interactive than Zombies Run was. Zombies was a good app to have as far as runningwise. This (Pokémon Go) is a good app to play as a game, and it gets me active as a side bonus." (M, 6, Pokémon Go)*

> *"Yeah, if there is not good gameplay, or an interesting story then I won't be interested. That interaction is very important." (M, 3, Pokémon Go)*

However, some users indicated a preference for a more streamlined and less interactive experience, largely arising from the perception of social pressures and the 'appropriateness' of gaming as a medium.

> *"I don't like apps that feel too much like a game as I don't want my clients to think I am not taking it seriously" (F, 15, PT in My Pocket)*

This reaction to an artifactual affordance that conceptually supports autonomy satisfaction through customisation seems to contradict existing literature that argues that such artifactual affordances are key to positive gamification outcomes (Pe-Than et al., 2014; Peng et al., 2012; Ryan et al., 2006). However, this response seems to be arising as a reaction to external factors such as social pressure and situated norms, rather than an innate reaction to the game mechanic itself. This response has been observed in other non-gaming contexts, particularly workplaces, with users shunning gameful experience and gameful interaction out of a desire to not be seen to be childish (Deterding, 2014).

Deterding (2011) defines these external factors as '*situated affordance*' and suggests that they both carry with them their own motivational affordances as well as influencing how the artefactual affordance of game mechanics are interpreted. However, limited exploration of this component of gamification has been conducted empirically. Thus the following section explores users responses to investigate the ways in which this '*situated affordance*' influences and contributes to the motivational experience of gamification.

4.4.4 Situated affordance

While some artifactual affordance was consistently associated with intrinsic motivation, such as ease of use, other sources yielded mixed results. This was the case even with sources of affordance well supported by extant research such as leaderboards or feedback mechanics like badges (Peng et al., 2012). While player type was one option explored to explain this discrepancy of responses as outlined in Section 4.4.3.3, thematic analysis resulted in clear support for situated affordance influencing how participants responded to and interpreted artifactual affordance. After several cycles of open coding of this data, it became apparent that while there was a very broad variety of situated affordance at play within our sample, they could be categorised by the degree of internalisation of the situated affordance. An example of this would be the negative response of Participant 15 to the artefactual

affordance of interactive gameplay. Their response was informed by a belief that clients may find the gameplay mechanics unsuitable due to perceptions they lacked the 'seriousness' necessitated by the situated norms of the personal trainer/client relationship, rather than a personal assessment by the participant as to their suitability. This highly externalised situated affordance is contrasted with a more internalised situated affordance in the form of Participant 6's positive reflections on how the virtual rewards offered by their gamified app, while lacking any value inherently, became valued due to their association with the participants pre-existing exercise goals. While both are examples of extrinsic motivation, as both are reliant on motivation outside of the individual rather than the direct motivation affordances of engaging in the behaviour, but the differences in how these situated affordances are internalised has significant implications for how they impact on the participants interpretations of a source of artefactual affordance.

To better integrate these findings into existing literature, the taxonomy of organismic integration theory (OIT), a sub theory of SDT (Deci & Ryan, 1985), was utilised to explore differences in levels of internalisation. OIT conceptualises extrinsic motivation as a continuum of regulatory styles categorised by the extent to which the extrinsic motivation has been internalised, with more internalised regulatory styles better predicting autonomous and maintained behaviour (Deci & Ryan, 2002). On the most externalised end of this continuum is external regulation, conceptualised as the motivation to engage in an activity to receive rewards or avoid punishments. This is followed by introjected regulation, an externally focused regulatory style in which the motivational affordance is only partially internalised and is expressed through undertaking behaviour to avoid guilt or disappointing others. One step closer towards internalisation sits identified regulation, in which the individual self identifies with the value or meaning of the behaviour and is commonly expressed through the setting of conscious goals. The most internalised of these motivation styles is integrated regulation, in which the motivator is integrated into an individual's sense of self through identifying the behaviour as being congruent with their values and personal beliefs (Deci & Ryan, 2002).

4.4.4.1 External regulation

While the gamified apps assessed by this study where all voluntary, there remained some discussion of externally regulated rewards and punishments. For one participant, their experience with their gamified app became akin to a job. Completing tasks to receive their virtual 'Pokémon' reward:

> *"It really was like that [a job] though. I am a bit of a completionist. I want to get everything, complete the collection … Like once you have caught most of the Pokémon you have to start finetuning to figure out how you are going to catch those last few Pokémon. It stops being a game and starts being a problem to solve." (F, 9, Pokémon Go)*

While some participants still considered this aspect of the app as a positive, others were less impressed with the use of virtual rewards and punishments and found these features undermined their enjoyment of the app and diminished their motivation to continue its use.

> *"It got a bit much, I would be leaving the app on, not even using it really, just to get these dumb supplies. At one point I realised I was just doing for the loot and stopped" (M, 11, Zombies Run)*

The key determinate as to how these highly extrinsic virtual rewards were interpreted by participants was the degree to which these rewards were valued by users, with positive responses associated with users who had pre-existing (typically nostalgic) connections to the underlying brand or product represented by the digital reward. Player type also seemed to influence this relationship, with terms such as 'completionist' being used to justify the participants drive to collect a virtual reward with limited practical value. However, the negative reaction by some to these rewards highlight what Kim and Werbach (2016) and Nicholson (2012) suggest may be a critical weakness of gamified apps. Namely, that the focus on virtual rewards and meaningless points that are not aligned with the needs of the user, and thus support competency satisfaction, will inevitably alienate audiences (Nicholson, 2012).

4.4.4.2 Introjected regulation

Commonly participants reported their experience of needs satisfaction was impacted on by their desire for approval. Often this approval came from others, as with the case of a participant who highlighted their desire to show off their in-game successes:

> *"They are hard to obtain, they are only in specific areas, it is a bigger reward that capturing a lower level Pokémon. I think it is bragging rights… Bragging to your mates, bragging rights are always an important part of the game" (M, 5, Pokémon Go).*

In addition to the motivationally salient features this situated affordance provided on its own, this type of affordance also shaped the interpretation of artifactual affordances. As previously discussed in Section 4.4.3.4, the interpretation of overtly game-like mechanics that support interaction was influenced by how suitable these features were for the situated norms of their context.

> *"I don't like apps that feel too much like a game as I don't want my clients to think I am not taking it seriously" (F, 15, PT in My Pocket)*

This demonstrates that social norms, and the perception of social pressure, may impact on how game mechanics can support intrinsic motivation and thus behavioural intention as predicted by Deterding (2011). However, it is unclear to what degree this can be compensated for by app design. This may present a contextual limitation to the use of gamification and should therefore be investigated in greater depth by future research.

4.4.4.3 Identified regulation

For many participants, their perceptions of whether particular feedback mechanisms were positive negative, or even superfluous, was dependent upon their alignment with the individual goals of the user. It was common for participants with explicit fitness goals to reject the virtual rewards offered by the gamified app, in favour of the less overtly gamified feedback mechanisms that possessed a clearer relationship to their stated goals.

> *"So my accomplishment is more personal, it's not really a badge or anything in there, but I love seeing that I have accomplished a whole block, a whole grid, compared to actually levelling up with the points." (M, 6, Fog of World)*

Importantly, however, some individuals demonstrated the capacity to internalise the collection of virtual rewards as a goal worthy of pursuit and so found the provision of these virtual rewards directly relevant and motivating to them.

> *"I have always loved Pokémon, so I tended to get fixated on it, when I am going to a place I automatically think, cool I can catch Pokémon there." (M, 3, Pokémon Go)*

It is unclear as to whether this internalisation is the result of use of the gamified app, or as a result of personality traits of the user. Investigating this through longitudinal experimental studies may be of importance to social marketers, given the calls to further develop social marketing interventions capable of facilitating the internalisation of extrinsic motivations (Hagger et al., 2014)

When both the virtual rewards and feedback mechanisms offered by the gamified app did not align at all with the personal goals of the user, the lack of relevance to these goals undermined intrinsic motivation and contributed to cessation of use of the gamified app.

> *"Yeah, probably the reason being I don't need an app to, you know, go out for fitness. I just enjoy walking, I really didn't need the story." (F, 8, The Walk).*

This highlights the importance of aligning gamification mechanics to pre-existing goals when targeting users who have already committed to personal goals with regards to the target behaviour.

4.4.4.4 Integrated regulation

While integrated regulation is considered the most integrated of the regulation types and should best predict behavioural maintenance and motivational outcomes, in this study, no participants discussed this level of self-regulation. This may suggest that those who typically engage in the use of voluntary gamification applications, do so specifically because they lack this level of integrated regulation toward the target behaviour and are seeking to augment this with other motivation regulations. It is acknowledged, however, that this assertion is speculative, and highlights the need for future research investigate this regulation style further as the lack of a response may be a result of the questions used.

4.4.4.5 Amotivation

To some users there was, however, very little utility to be derived from the gamified apps that they had used. For most, this amotivation arose from a failure of the gamified app's marketing to manage expectations, resulting in the users becoming disappointed in the product they received:

> *"I couldn't really see much point to it, so I just gradually lost interested. I think if they had more of the classic features like battling and trading it might be more interesting." (F 12, Pokémon Go)*

> *"I was hoping for a Pokémon game I could play on my phone, so I was expected the stuff I was used too like battling. Once I saw the game was mostly the augmented reality stuff I lost interest pretty quickly." (M 7, Pokémon Go)*

> *"It just wasn't what I wanted, it sorted my nostalgia fix for Pokémon, but I didn't find the actual app itself any fun." (F 19, Pokémon Go)*

Others mentioned the gameplay term 'grind'; referring to the process of working towards an in-game goal through repetitive actions that individually contribute very little to the achievement of this goal. In SDT examinations of voluntary video games, grind is typically associated with a disconnect between action and outcome, limiting feelings of both competency and autonomy, and undermining intrinsic motivation (Peng et al., 2012).

> *"To be honest it has gotten to be a bit of a grind, as you get closer to level 40, which is the cap, and the lack of new pokemon coming out, it is just a standard RPG grind. So it is a bit exhausting staying on top of that." (M, 2, Pokemon Go).*

In both cases, this amotivation negatively impacted on needs satisfaction. Autonomy needs satisfaction was negatively affected when consumers were disappointed in the choices unavailable to them, which they had expected to have, and competency needs satisfaction was negatively affected when the user felt as though their actions did not contribute enough to the realisation of the outcomes they desired.

4.5 Implications of the Findings

4.5.1 Theoretical implications

This study, through open exploration of a variety of motivation and behavioural determinates, identifies several limitations of previous theoretical conceptualisations of the mechanisms underpinning gamification's impact on behaviours. Primarily, by identifying that different individuals report varying motivational outcomes arising from their interaction with analogous game mechanics, this paper highlights that previous feature or game mechanic focused conceptualisations of motivational affordance (Deterding, 2014; Nacke & Deterding, 2017) may not be sufficient to explain gamification outcomes. While identifying the source of these differences will require further research, this study helps to clarify some of the situated (context derived) affordances that impact on gamification outcomes, moving beyond the current focus on artifactual (gamification feature derived) affordance (Deterding, 2011).

Specifically this study, through the identification of common categories of meaning in the various situated affordances discussed by participants, provides preliminary support for the use of organismic integration theory (OIT; Deci & Ryan, 1985) to both define and understand how context impacts on the motivational outcomes of gamification. While OIT has seen considerable expansion in the SDT theory literature, it has not yet been assessed in a gamification context. This is of particular importance given the increasing calls to examine in detail the role of extrinsic motivation in gamification (Korn & Schmidt, 2015; Mekler et al., 2017; Mitchell et al., 2017) as well as to use more rigorous and established measures of these variables to improve the comparability of results (Hamari, Koivisto, & Sarsa, 2014). The lack of established theory within previous discussions of situated affordance in gamification literature has limited the ability to compare results across papers, or even capture useful empirical data to be used in analysis of this concept (Deterding, 2014; Nacke & Deterding, 2017). This study's finding that internalised extrinsic motivation may support, rather than harm, behavioural maintenance is therefore significant as it suggests that OIT may prove a useful taxonomy for the measurement and assessment of external motivation in gamification.

The findings also highlight the potential for gamification to contribute to the internalisation

of regulatory style, with some users reporting conscious goal setting around virtual rewards reflecting a perceived personal value despite the absence of external reward or punishment. While this requires longitudinal quantitative research to confirm, this would be of significance to both SDT research and social marketing research given the importance both fields of study place on the internalisation of motivation (Deci & Ryan, 1985; Hagger et al., 2014).

Last, this paper also contributes to the social marketing literature by applying behavioural theory to better understanding the determinates of technology-based intervention attrition. Given the ongoing difficulties in demonstrating positive behavioural exchange in this context, social marketers have called for additional research into pro-health interventions (Wilson & Brookfield, 2009, Lee & Kotler, 2019). By exploring the factors that contribute to the success of gamifying, an emerging e-health offering, this paper also addresses the call for further research into digital social marketing products (Lefebvre, 2009).

4.5.2 Practical implications

This research is directly relevant to social marketers seeking to implement gamified apps in interventions. This study suggests that gamification may support behaviour change, even in situations where users lack pre-exiting motivation to engage in the behaviour. This is relevant to social markers given the limited existing motivation to engage in a wide range of personally beneficial and socially desirable behaviours such as physical activity (Thøgersen, 2005). However, this research also suggests that where and when behaviour focused goals develop, the gamified app must maintain relevance to the identified regulation of users. Specifically, competency supportive feedback should be tailored to the goals and interest of the target audience, rather than issued as meaningless virtual rewards. More broadly, this study provides some qualitative evidence that novelty is an important component of successful gamification intervention. Social marketers seeking to use this product offering should be mindful of the need to provide ongoing updates and support to prevent users becoming bored of the app. Expectations of the product should also be managed to ensure that potential users do not have misperceptions regarding the apps' features or capacity, as this can negatively impact on needs satisfaction.

Overall, this research highlights the need to prioritise the satisfaction of autonomy,

competence and relatedness needs in gamified intervention design. Findings also highlight that specific game features may support the satisfaction of these needs. Supportive feedback and progression metrics such as points and badges were suggested to facilitate competency satisfaction, while in app decision making and player choice were suggested to drive autonomy satisfaction. Relatedness satisfaction was largely a function of existing social networks, with mixed support for the use of gamification features to specially support this need. However, some users reported that in app social systems and the ability to share results provided opportunities for relatedness satisfaction. Taken together, these findings suggest that gamification interventions should be designed with a wide range of need supportive features, rather than the simple points driven approaches that have been common in previous studies (Nacke & Deterding, 2017).

However, this research also demonstrates the potential for context to influence the relationship between users and the gamified app. Social pressure and other sources of introjected regulation can undermine the capacity for a gamified intervention to support intrinsic motivation. These findings reflect a growing concern over the use of gamification, with some research suggesting that many forms of gamification (particularly points and leaderboards) may amplify extrinsic pressure in contexts that are autonomy restrictive such as workplaces (Kim & Werbach, 2016; Korn & Schmidt, 2015). In addressing this, social marketers should encourage an environment that is free from external control and pressure, while encouraging positive interpersonal relationships between the users of the gamified app.

4.6 Limitations and Conclusion

This study provides some support for the use of OIT in understanding the contextual affordances that impact on gamification motivational outcomes. However, non-probability sampling such as the purposive sampling undertaken in this study limit the generalisability of this research to other contexts (Crabtree & Miller, 1999). For this reason, the results of this study should be triangulated with additional research to demonstrate external validity (Creswell & Miller, 2000).

This is particularly important, as face to face interviews increase the potential for social

desirability bias to influence the responses given (Duffy et al., 2005). This limitation is particularly significant given the potential for respondents to consider their behavioural motivations embarrassing (Sethna & Blythe, 2016).

Homogeneity of behavioural context potentially limits the external validity of the findings (Hair et al., 2003), as gamification in other non-health contexts may have significantly different factors underpinning its use.

In conclusion, despite the scope and limitations of this study, it provides preliminary findings which future research can build upon to develop an improved understanding of the artefactual and contextual factors that impact of gamifications capacity to support psychological needs satisfaction. In particular, this research draws upon OIT to suggest that this macro theory of human behaviour can be used to categorise the contextual factors that may influence this relationship, suggesting that OIT may be useful in understanding the theoretical mechanism for gamification's outcomes.

Chapter 5: Motivation in Health and Workplace Gamification

The last chapter presented the results of Study One on consumer perceptions of gamification, which indicated qualitative support for the role of extrinsic motivation in the ability of gamification to support intrinsic motivational pull. This chapter presents the results of Study Two in the context of health and workplaces, that seeks to quantitatively confirm the findings of Study One. As with the previous chapter, these results are presented in the format of a journal article. A brief introduction to the study is included in Section 5.1. The research hypotheses are described in Section 5.2 and the methods employed to test these hypotheses in Section 5.3. The results of this study are outlined in Section 5.4, with specific data on the health context in section 5.4.1 and the workplace context in section 5.4.2. A discussion of these results is included in section 5.5, followed by the implications (Section 5.6) and limitations (Section 5.7) specific to this study.

5.1 Introduction

Extant gamification research has largely focused on investigating the positive aspects of gamification; the ways that gamification can have positive impacts on behaviour and behavioural antecedents, or the ways that gamification can be better optimised to achieve the aforementioned (Hamari et al., 2014; Oprescu et al., 2014). A key weakness of this body of research then is that it has largely shied away from exploring negatives; either factors that negatively contribute to gamification's outcomes, or as has been increasingly called for in the literature, the potential for unintended negative outcomes of gamification (Bogost, 2013, Kim & Werbach, 2016, Lewis, Swartz, & Lyons, 2016). A large component of this criticism is the demonstrated potential for gamification to undermine the intrinsic motivation to perform the behaviour being targeted in the few studies that have explored negatives (eg: Farzan et al., 2008; Hanus & Fox, 2015, as discussed in section 2.3 and 2.4). This is further complicated by several studies that have demonstrated positive behavioural outcomes without increased intrinsic motivation towards the behaviour being targeted (Korn & Schmidt, 2015; Mekler et al., 2017; Mitchell et al., 2017, as discussed in section 2.4). This contrasts with the accepted conceptualisation of gamification as a method through which the intrinsic motivational pull of gameplay (Ryan, Rigby, & Przybylski, 2006) can be

transferred to a non-game environment through the adaptation of game mechanics (Deterding, 2014; Zichermann & Cunningham, 2011). Indeed, these game mechanics are well understood to be an integral part of the motivational pull or appeal of voluntary games (Peng et al., 2012).

However, as highlighted through the results of Study One (refer to Chapter 4), some users found that the mechanics of their gamification applications interfered with how they would intuitively engage in the behaviour. Participants highlighted that the virtual rewards on offer through the gamified mobile application (app) that formed the focus of the study distracted from the intrinsic benefits of the physical activity. This was further complicated by external motivational forces that influenced gamified app use, such as the expectations of friends and family to use the app. Overall, Study One then provided qualitative support for the notion that extrinsic motivation in gamification interventions can reduce the ability of that intervention to achieve positive intrinsic motivational outcomes.

The negative impact of extrinsic motivation on intrinsic motivation is well-established in psychology and microeconomics literature, often dubbed '*Motivation Crowding'* or '*The Overjustification Effect*' (Carlson, Neil, & Donald, 2007; Ogilvie & Prior, 1982). Broadly, the effect of introducing a source of extrinsic motivation (such as rewards/punishments, or social pressure) is to shift a behaviour's motivational focus toward this new motivator and away from the behaviour's existing intrinsic motivational pull. Thus, while extrinsic motivation if sustained can bring about behavioural maintenance, it has negative implications for maintenance if the extrinsic motivator is ever removed due to the reduction in intrinsic motivation. Despite this, and despite how common concepts such as intrinsic and extrinsic motivation are in gamification literature, studies that empirically investigate extrinsic motivation in gamification remain scare (Seaborn & Fels, 2015). This is an important gap for social marketers, given that they typically operate in settings regulated by extrinsic motivation and with limited initial intrinsic motivational appeal (Bloom & Novelli, 1981; Rothschild, 1999; Thøgersen, 2005), which may present limitations to the use of gamification in these settings.

This research will therefore contribute to an improved understanding of the determinates of gamification's behavioural and psychological outcomes through an empirical investigation of

individuals' perception of intrinsic and extrinsic motivation in gamified apps. Building on the findings of Study One, this study will quantitatively determine the extent to which extrinsic motivation is associated with changes in intrinsic motivation, as well as use intention. It aims to provide further empirical support for the use of self-determination theory (SDT) within gamification research, while broadening the use of this macro-theory to incorporate a more nuanced understanding of extrinsic motivation through the integration of organismic integration theory (OIT). This will contribute to the social marketing literature, addressing the limited extant research into the capacity for social marketing interventions to facilitate the internalization of extrinsic motivations (Hagger et al., 2014). It will additionally contribute to the gamification literature, addressing the call for research to move beyond the behavioural and de-contextualised focus of previous research, and towards a theory driven understanding of the motivational experience of the end-user (Deterding, 2014; Nacke & Deterding, 2017).

The following section delineates a literature review that develops the hypotheses of this study. Next, the methodology of the research is presented. The paper ends with a discussion of the results and their theoretical and practical implications.

5.2 Literature Review and Development of Hypotheses

Gamification research, as an emerging area of enquiry, has experienced several evolutions in its focus (Nacke & Deterding, 2017). The initial wave of research focused on clarifying the area of inquiry through the formation of definitions and establishing face validity through answering the question "does gamification work?" (Hamari et al., 2014; Seaborn & Fels, 2015). While this initial work was vital for establishing the field of gamification research, without a theory driven focus on *how* gamification can modify behaviour, these studies provided limited ability to contribute to the accumulation of knowledge or predict the efficacy of new gamification designs and contexts (Deterding, 2014; Lewis et al., 2016; Mekler et al., 2017; Seaborn & Fels, 2015).

As enquiry into gamification has matured, the new focus of this research has been understanding the mechanisms that underpin gamification's effect on behaviour (Nacke & Deterding, 2017; Seaborn & Fels, 2015). While several theoretical lenses have been used to address this knowledge gap (as addressed previously in Chapter 2) the most widely accepted explanation for the behavioural impact of gamification is that through gameplay it can create intrinsically motivating game-like experiences (Hamari, 2017; Mekler et al., 2015; Seaborn & Fels, 2015). Self-determination theory (SDT), a macro theory of human motivation concerned primarily with the drive to satisfy innate psychological needs (Deci & Ryan, 2002), has emerged as the primary theory used in gamification research to understand and examine this process (Deterding, 2015; Seaborn & Fels, 2015).

SDT was developed through research into the differences between motivation that was derived inherently from a behaviour, and motivation that was external to the behaviour (Deci, 1971). This inherent, or intrinsic motivation is the direct result of engaging in the behaviour, such as enjoyment, engagement, or the opportunities for cognitive and social development provided by the task (Deci & Ryan, 2002). In contrast, extrinsic motivation is external to the behaviour (Deci & Ryan, 2002) and is usually the result of the outcomes of a behaviour, such as rewards, punishments, or social pressure (Ryan & Deci, 2000).

Both extrinsic motivation and intrinsic motivation interact to result in the motivational experience of a user, and jointly predict performance (Cerasoli et al., 2014). However, given the demonstrated capacity of intrinsic motivations to exert stronger self-directed motivational pull, as well as better predict behavioural maintenance (Grant, 2008; Ryan et al., 1997), intrinsic motivation has been the principal focus of extant gamification research (Nacke & Deterding, 2017).

5.2.1 Needs satisfaction and intrinsic motivation

A core component of SDT, is the premise that intrinsic motivation is the result of the human tendency to seek out opportunities to satisfy three basic psychological needs (Deci & Ryan, 1991; Vansteenkiste et al., 2010). These needs are identified as competence (the need to feel challenged but capable of mastering that challenge), autonomy (the need to possess causal agency and freedom of choice), and relatedness (the need to interact and meaningfully connect with others) (Deci & Ryan, 2002). Needs satisfaction generally predicts

both the quantity and quality of behavioural exertion, behavioural maintenance and psychological well-being across a wide variety of domains (Deci & Ryan, 2008a; Sheldon et al., 2001).

Subsequently, behavioural modification interventions (such as gamification) will possess more motivational pull when the elements of the intervention facilitate greater needs satisfaction (such as through supportive feedback and player choice) (Frederick & Ryan, 1995; Vallerand & Reid, 1984). Conversely when a behavioural modification intervention reduces these feelings, such as through negative feedback or controlling rewards, intrinsic motivation is decreased (Deci & Ryan, 1985; Deci, Koestner, & Ryan, 1999; Vallerand & Reid, 1984). This has been supported by research suggesting that intrinsic motivation mediates or partially mediates the relationship between needs satisfaction and behavioural intention in health (Schneider & Kwan, 2013), the workplace (Arshadi, 2010) and education (Arnone et al., 2009) contexts. Importantly these behavioural contexts represent those most commonly targeted by gamification interventions (Koivisto & Hamari, 2019), with the health context representing the primary focus of the social marketing domain (Gordon, 2011).

While most research in video game settings has focused on competence and autonomy needs on the basis of SDT, relatedness needs satisfaction has also been found to increase intrinsic motivation in video games (Ryan et al., 2006). On this basis, the following hypotheses are proposed in accordance with SDT:

> H1: The satisfaction of autonomy, competency, and relatedness needs will positively influence intrinsic motivation.
>
> H2: Intrinsic motivation will mediate the relationship between needs satisfaction and behavioural intention, indicated by: (a) insignificant relationship between psychological needs satisfaction and behavioural intention and (b) positive relationship between Intrinsic motivation and behavioural intention.

While these hypotheses are supported by previous SDT research and theory (Ryan et al., 2006), research in the gamification context has not always consistently demonstrated these links. Peng et al. (2012) described that augmenting a gamification program with autonomy and competency satisfying mechanics such as avatar customization and interactive feedback

resulted in increased autonomy and competence satisfaction as well as intrinsic motivation. Different results were observed by Sailer et al. (2017) who after introducing a range of game features into their online education simulation found they could increase competency and relatedness needs satisfaction, but not autonomy needs satisfaction. Gamification has also been found to have limited impact on needs satisfaction or intrinsic motivation. Mekler et al. (2017), for example, demonstrated that gamification increased performance on an image annotation task, but without significant increase to competency needs satisfaction or intrinsic motivation. Similarly, Mitchell et al. (2017) demonstrated that a gamified fitness app increased exercise behaviour but did not significantly impact intrinsic motivation. Indeed, Hanus and Fox (2015) demonstrated that a gamified education course actually undermined autonomy needs satisfaction resulting in a decrease in both intrinsic motivation and test scores (Hanus and Fox, 2015).

One reason that has been suggested for these inconsistencies in results, is that gamification research has largely focused on the positive outcomes of gamification use such as intrinsic motivation, or behavioural change, and has largely shied away from measures that explore the negative aspects of this technology (Bogost, 2013; Kim & Werbach, 2016; Lewis, Swartz, & Lyons, 2016). Indeed, some scholars have suggested that in many cases gamification's behavioural impact may actually stem from the game mechanics employed amplifying unmeasured extrinsic motivation such as the social pressure from researchers (e.g., Korn & Schmidt, 2015; Mekler et al., 2017; Mitchell et al., 2017).

The role of extrinsic motivation in gamification is further highlighted by Study One (see Chapter 4), which suggested that an individual's motivational outcomes and evaluation of a gamification experience is highly influenced by their motivational context. The study identified factors external to the behaviour such as the opinions of peers or the interpretations of gameplay mechanics as virtual rewards rather than play systems, as playing a large role in their motivation to use the gamified app. This is akin to Deterding's (2011) conceptualisation of situated affordance and provides further support for their call to move beyond the current focus on intrinsic motivation and examine in greater detail the role of extrinsic motivation in gamification outcomes.

5.2.2 External motivation and regulatory styles

While extrinsic motivation is an oft discussed topic in gamification research, it is not one that has been the focus of empirical work and as such, definitions of this concept vary from paper to paper (Seaborn & Fels, 2015). To some, gamification itself is an extrinsic motivator, with game design mechanics such as points and badges analogous to other sources of external reward, and leaderboards a kind of virtual punishment for low performers (Hanus and Fox, 2015). Case studies of gamification in the workplace, such as Disneyland Resort's gamification of their laundry department through digital leaderboards, support the potential for these features to amplify extrinsic pressure, with some employees finding the practice publicly embarrassing and describing the system as an "electronic whip" (Lopez, 2011).

To other researchers, however, extrinsic motivation is a contextual factor that impacts on how their results are to be interpreted. In particular, Mekler et al. (2017) and Mitchell et al. (2017) suggest that the lack of change in intrinsic motivation despite the positive behavioural outcomes observed in their research may be the result of contextual autonomy limitations in the research context which limited the capacity for their gamification applications to support needs satisfaction. This perspective largely draws on the aforementioned psychological concept of '*Motivation Crowding*', through which the presence of an extrinsic motivator can 'crowd out' an existing intrinsic motivation and result in an externally fixated motivation orientation (Carlson, Neil, & Donald, 2007; Ogilvie & Prior, 1982).

SDT explains the phenomenon as the result of post-behavioural evaluations individuals make about sources of motivation, to cognitively justify their own behaviour and determine future motivational orientations (Deci, 1975). External sources of motivation are comprised of two components that are used in this evaluation: an autonomy restrictive component (do this behaviour to get a reward/avoid a punishment) and a competence boosting component (you received this reward/avoided this punishment due to your good behaviour) (Deci and Ryan, 1980). Because of this, extrinsic motivation does not necessarily have to undermine intrinsic motivation when the extrinsic incentives align with the values, identity, and personal goals of an individual (Ryan & Deci, 2000). A sub-theory of SDT, organismic integration theory (OIT), explores this component of extrinsic motivation's impact on individuals with a

particular focus on the internalisation and integration of these forces (Deci & Ryan, 1985). Rather than conceptualising intrinsic motivation as a dichotomous state opposite to extrinsic motivation, it posits that extrinsic motivation is expressed through a continuum of regulatory styles categorised by the extent to which the extrinsic motivation has been internalised (Deci & Ryan, 2002).

On the most externalised end of this continuum is external regulation, conceptualised as the motivation to engage in an activity to receive rewards or avoid punishments. This is followed by introjected regulation, an externally focused regulatory style in which the motivational affordance is only partially internalised and is expressed through undertaking behaviour to avoid guilt or disappointing others. One step closer towards internalisation sits identified regulation, in which the individual self identifies with the value or meaning of the behaviour and is commonly expressed through the setting of conscious goals. The most internalised of these motivation styles is integrated regulation, in which the motivator is integrated into an individuals' sense of self through identifying the behaviour as being congruent with their values and personal beliefs (Deci & Ryan, 2002). While identified regulation and integrated regulation are considered theoretically distinct, it is common in OIT research to measure only one of these constructs due to difficulties in psychometrically distinguishing these regulation styles (Vallerand et al., 1992). Importantly, however, even the more integrated regulatory styles such as identified regulation and integrated regulation are still not intrinsic, as they are not derived from internal features of the behaviour but that of its instrumental or functional value (Deci & Ryan, 2002; Deci & Ryan, 1995).

Deci and Ryan (1985) proposed that the degree to which a regulation style is internalised corresponds to how autonomous the behaviour becomes as the individual reinforces the motivator themselves. This is reflected the association between behavioural maintenance and the two most internalised regulatory styles (identified and integrated regulation) across a variety of contexts including education (Miserandino, 1996), healthcare (Williams et al., 1996), and exercise (Ryan et al., 2008). In contrast, the more externalised regulatory styles (external and introjected regulation) are commonly associated with the aforementioned 'overjustification effect', crowding out intrinsic motivation and harming self-directed behavioural maintenance (Deci & Ryan, 2008b).

Despite the importance of extrinsic motivation to gamification research, to date no studies have explored OIT concepts empirically. Nonetheless, on the basis of the aforementioned extant OIT research it is hypothesised:

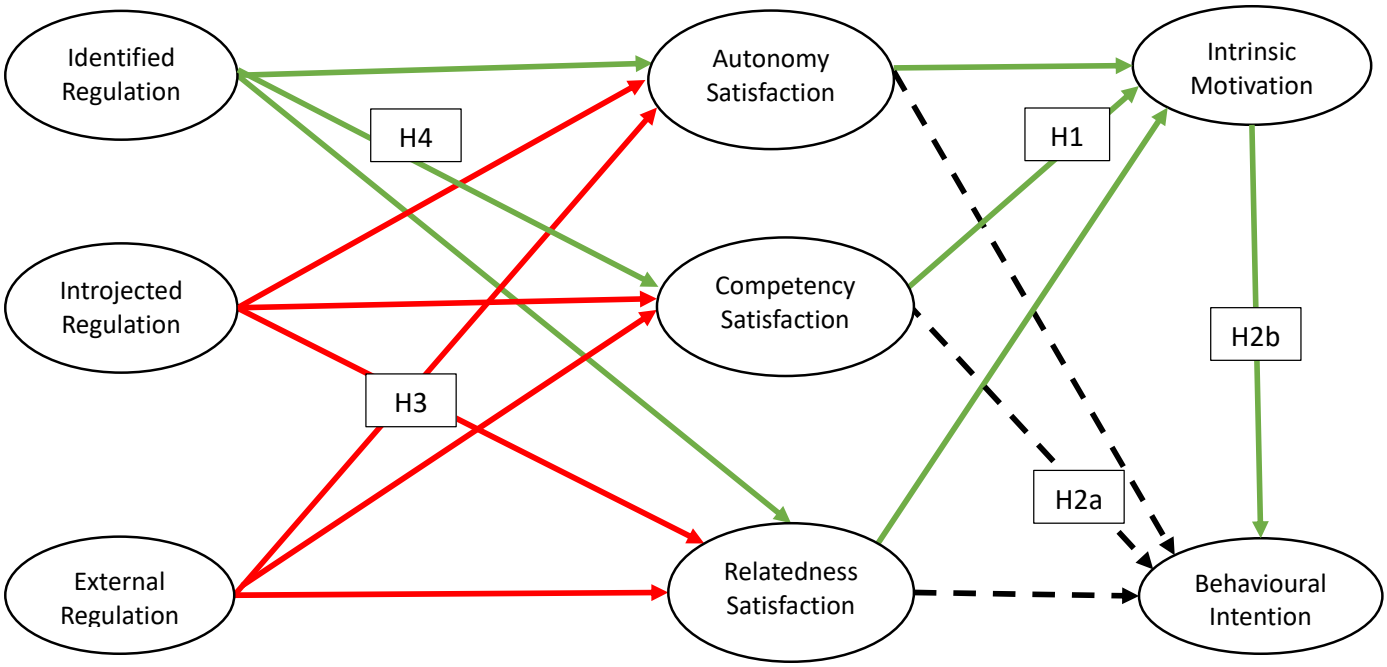
> H3: An externalised regulatory style (external and introjected regulation) will negatively influence autonomy, competence, and relatedness needs satisfaction.
>
> H4: An internalised regulatory style (identified regulation) will positively influence autonomy, competence, and relatedness needs satisfaction.

The four hypotheses of this study are summarised below in Table 5. Their combination results in the below research model of gamification use intention and antecedents (Figure 2), which will be tested through the methodology outlined in the following chapter.

Table 5: Summary of study two hypothesis

Hypothesis	Summary
H1	The satisfaction of autonomy, competency, and relatedness needs will positively influence intrinsic motivation.
H2	Intrinsic motivation will mediate the relationship between needs satisfaction and behavioural intention, indicated by: (a) insignificant relationship between psychological needs satisfaction and behavioural intention and (b) positive relationship between intrinsic motivation and behavioural intention.
H3	An externalised regulatory style (external and introjected regulation) will negatively influence autonomy, competence, and relatedness needs satisfaction.
H4	An internalised regulatory style (identified regulation) will positively influence autonomy, competence, and relatedness needs satisfaction.

Figure 2: Research model of gamification use intention and antecedents



Note. Green indicates hypothesised positive relationship; red indicates hypothesised negative relationship. Dotted line indicates hypothesised insignificant relationship.

5.3 Methodology

5.3.1 Research context

To test the research hypotheses, data was collected from users of mobile based gamification applications (apps) in the contexts of personal health and workplace gamification. These contexts are among the most commonly targeted by gamification interventions (Koivisto & Hamari, 2019), and both contexts are rich in instrumental or functional value to both individuals and society while commonly lacking in intrinsic motivation. These characteristics make them promising targets for social marketers (Hastings, 2003; 2007). The focus on mobile apps reflects the way that gamification is typically implemented in social marketing contexts (Lister et al., 2014) and address calls for gamification research on motivation and other behavioural antecedents in naturalistic settings (Deterding, 2014; Seaborn and Fels, 2015). Testing the research model in two contexts also has the advantage of assessing its external validity. As this model represents the relationships proposed by OIT, a cross-

contextual motivation theory (Deci & Ryan, 1985), it can be expected that this model would hold true in both health context and workplace contexts. However, while it is expected that the model will apply to both a personal health and workplace context, differences and similarities between these contexts were expected to allow this study to explore the role of extrinsic motivation in greater detail.

Health and fitness represent a major focus for social marketing research given the increasing burden of lifestyle diseases on society (AIHW, 2018), as well as the historical difficulties social marketers have had in targeting these behaviours (Wilson & Brookfield, 2009, Lee & Kotler, 2019). Given that even moderate changes to health-related behaviours can yield profound health benefits if sustained (Norton, Norton, & Sadgrove, 2010), research into motivational supportive tools and technology (such as gamification) in this context is of tremendous value to social marketers (Lee & Kotler, 2019).

In a work context, gamification has seen positive impacts across a range of behavioural antecedents and outcomes (Hamari, Koivisto, & Sarsa, 2014; Oprescu, Jones, & Katsikitis, 2014). However, the negative potential of gamification amplifying extrinsic motivation has emerged as an important ethical concern (Bogost, 2013; Kim & Werbach, 2016). As discussed in greater detail in Chapter 2.4.2.2, common gamification mechanics such as points and badges may be interpreted as a means of control in the workplace (Callan, Bauer, & Landers, 2015; Korn & Schmidt, 2015). Because of this, understanding the impact of extrinsic motivation on gamification outcomes is of vital concern to researchers (Kim and Werbach, 2016).

In both the health context (Hagger, Chatzisarantis, & Harris, 2006) and the workplace context (Dobre, 2013; Ertürk & Vurgun, 2015) the initial intrinsic motivation to perform the behaviour is limited. It is because of gamification's theorised capacity to support intrinsic motivation that this technology has seen such growth in these contexts (Koivisto & Hamari, 2019). Because of this similarity, we expect to see similar relationships between needs satisfaction, intrinsic motivation and behavioural intention.

However, unlike the health context, in which gamification use is typically self-directed and voluntary (Lister et al., 2014), gamification in the workplace is often undertaken at the recommendation or instruction of colleague, representing a much more salient external

pressure than is common to other contexts (Kim, 2015). Indeed, the workplace is generally considered to be a highly autonomy restrictive environment, due to the presence of clearly defined external regulation sources such as wages and the threat of disciplinary action (Gerhard & Fang, 2015). Contrasted with the personal health context, which is typically regulated through introjected, identified or integrated regulation (Vallerand, 1997), the clearly defined external regulation styles of the workplace may result in differences between initial levels of regulation style and potentially even in the relationships between regulation styles and model fit. Thus, through a contrast of results between these two behavioural domains, this research may allow for the interaction of context as a background factor to be assessed (Lynch, 1982).

5.3.2 Target population

An online self-administered survey was conducted, targeting individuals 18 years or older who were either currently using a gamified app or had used such an app in the last three months. Restricting the sample to only current and recent users of gamified apps reduces the potential for recall bias (Sackett, 1979). Data was collected separately from individuals who had used such an app in the personal fitness and health domain, and from those in the workplace domain. Participants were screened to ensure they only completed one of these surveys through simple IP address matching (although no incidence of this was found).

Data was collected primarily through Amazon Mechanical Turk (mTurk), an online crowdsourcing website for human intelligence tasks that for the purposes of an online survey operates in a similar way to traditional consumer panels. A job posting was made for survey participants, and participants were offered a payment of US$0.60 for their time. Concerns have been raised regarding the validity of samples recruited online from crowdsourced recruitment services, such as mTurk, owing to the potential for automated "bot" participants and inattentive reporting (Fleischer, Mead, & Huang, 2015). However, when appropriate proactive steps are undertaken, such as timing task postings to correspond with average work hours in the United States and prohibiting multiple responses from the same IP address (Smith et al., 2016), mTurk samples are largely equivalent to those obtained through more traditional recruitment strategies (Casler et al., 2013).

5.3.3 Instrument development and data collection

The surveys for each study were hosted through the online survey tool Qualtrics and both comprised of 42 questions. On average participants took approximately 10 minutes to complete the survey. The survey opened with an informed consent item, simple demographic questions, and then several diagnostic questions to identify the name and type of gamified app being used. Participants were instructed to identify a specific single gamified app they had used and answer the questions in the survey in regard to that app only.

The key variables were assessed via contextualised versions of three pre-validated scales: the player experience of need satisfaction (PENS) scale (Ryan et al., 2006), the multidimensional work motivation scale (Gagné et al., 2015) and a behavioural intention scale (Cronin, Brady, & Hult, 2000). Responses to these scales were measured via a 7-point Likert scale, weighted from strongly disagree to strongly agree. To reduce the impact of presentation effects, the order of items within each scale and the order of the scales themselves were randomised (Murdock, 1968).

The PENS scale was used to assess relatedness, autonomy, and competency needs satisfaction with three items per concept. Example items include “I was able to use the app the way I wanted to use it” (autonomy), “I felt able to meet the challenge of performing well in this app” (competence), and “I found the relationships I formed in this app important” (relatedness). The motivation at work scale (Gagné et al., 2015) was contextualised towards to a gamification setting, and measures of integrated regulation removed due to difficulties in psychometrically distinguishing this construct from identified regulation, a common issue in OIT research (Vallerand et al., 1992). This scale assessed intrinsic motivation as well as identified, introjected, and external regulatory styles. Example items include “I use the app because other people say I should” (external), “I feel guilty when I don’t use the app” (introjected), “I value the benefits of using the app” (identified), and “I use the app because it’s fun” (intrinsic). To assess behavioural intention, Cronin et al.’s (2000) behavioural intention scale was employed. An example item is “I will continue to use this app”. As gamification involves the direct modification of a behaviour through game mechanisms (Deterding et al., 2011a), behavioural intention to continue to use the gamification application necessitates continued performance of the target behaviour. Because of this, app use intention additionally serves as a proxy measure of behavioural impact.

5.3.4 Analysis plan

Structural Equation Modeling (SEM) using the maximum likelihood method was used to examine the structural model proposed by the hypotheses in AMOS 24.0. Because of the ability of this modelling tool to test for relationships between contracts via multiple regression and factor analysis (Kline, 2011), it is ideally suited to addressing these hypotheses. In particular, SEM allows for the assessment of mediation relationships between variables by identifying when the incorporation of a mediation variable reduces the regression coefficient between two other variables to indicate that the relationship is better explained as the first variable influencing the second indirectly through an association with the mediation variable (Baron & Kenny, 1986). Given that H2 proposes that needs satisfaction will impact behavioural intention indirectly through stimulation of intrinsic motivation, SEM will be used to assess the direct/indirect nature of this relationship as suggested by Cheung and Lau (2008).

A two-stage approach was undertaken to firstly establish the discriminate and convergent validity of the hypothesised model, followed by testing of the full structural model as suggested by Anderson and Gerbing (1988).

5.4 Data Analysis and Results

The results of this analysis plan are delineated below, separated by context for readability. Comparisons between these contexts are discussed in the following section, however for ease of access a table outlining the results of this analysis on the hypothesis of this study is provided below as Table 6.

Table 6: Results of study two hypothesis testing across health and business contexts

Hypothesis	Health Result	Business Result	Outcome
H1: The satisfaction of autonomy, competency, and relatedness needs will positively influence intrinsic motivation.	Autonomy/competency needs satisfaction associated with intrinsic motivation, relatedness needs satisfaction relationship lacked statistical significance. H1 partially supported.	Autonomy/ competency needs satisfaction associated with intrinsic motivation, relatedness needs satisfaction relationship lacked statistical significance. H1 partially supported.	H1 partially supported across both contexts, with relatedness lacking statistical significance.
H2: Intrinsic motivation will mediate the relationship between needs satisfaction and behavioural intention, indicated by: (a) insignificant relationship between psychological needs satisfaction and behavioural intention and (b) positive relationship between Intrinsic motivation and behavioural intention.	Satisfaction of autonomy and competency needs showed positive relationships with behavioural intention only when mediated through intrinsic motivation. This supports both H2a and H2b.	Satisfaction of autonomy and competency needs showed positive relationships with behavioural intention only when mediated through intrinsic motivation. This supports both H2a and H2b.	H2 supported across both contexts.
H3: An externalised regulatory style (external and introjected regulation) will negatively influence autonomy, competence, and relatedness needs satisfaction.	Introjected regulatory styles negatively associated with autonomy, competency and relatedness needs satisfaction. External regulatory style, while negatively associated with autonomy and competency, was positively associated with relatedness. H3 was thus partially supported by the research.	Introjected regulation was not significantly associated with needs satisfaction. External regulatory style was negatively associated with autonomy and competency, but positively associated with relatedness. Thus H3 was partially supported by the research.	H3 partially supported, but with differences in the impact of introjected regulation between work and health contexts.
H4: An internalised regulatory style (identified regulation) will positively influence autonomy, competence, and relatedness needs satisfaction.	Identified regulation style positively associated with autonomy, competency and relatedness satisfaction, supporting H4.	Identified regulation style positively associated with autonomy, competency and relatedness satisfaction, supporting H4.	H4 supported across both contexts.

5.4.1 Health context

5.4.1.1 Data cleaning

Before analysis was undertaken on the data from the health context, the data set was first checked to ensure that participants met the inclusion criteria. Of the original 250 participants, 15 were excluded for identifying a non-health related app (common apps excluded included non-gamified mobile games such as Clash of Clans or Candy Crush Saga) and a further 12 excluded for obvious data entry errors (or possible satisficing) indicated by long strings of identical answers, resulting in a total sample of 223. This sample size meets the accepted minimum size (n = 200) for SEM (Kline, 2011).

5.4.1.2 Assessment of normality and common method bias

Given the dataset used was smaller than 2000 elements, the Shapiro-Wilk test of univariate normality was applied to examine the distribution of the dataset against the assumptions of structural equation modelling (Kelloway, 1995). This test revealed significant departure from normality across all tested variables at the $p < .05$ (two-tailed) significance level. Univariate skewness and kurtosis levels were acceptable (between −1.0 to +1.0) for all variables other than behavioural intention (skewness -1.27 [0.16], kutosis 1.69 [0.32]), indicating that the overall effect of non-normality on this data was minimal (Muthén & Kaplan, 1985). Because of this, no transformations of the variables were undertaken. However, to account for the presence of multivariate non-normality a bootstrap procedure, based on 500 bootstrap samples and a 95% bias-corrected confidence interval, was performed on the measurement model as recommended by Bryne (2016).

To measure the impact of common method bias, Harman's single factor test was preformed to assess how much variation in the model is explained by common instrumentation (Chang, Van Witteloostuiin, & Eden, 2010). This test returned a single factor with an explained variance of 33.68%. As this result was lower than 50%, common method bias was considered acceptable and so no additional controls beyond assessments of model fit were used (Chang, Van Witteloostuiin & Eden, 2010).

5.4.1.3 Sample characteristics

Of the 223 participants in the health context, 59.3% were male, 37.1% were female and 3.6% non-binary/unspecified. The mean age of participants was approximately 32 years old,

with a range of 18 to 64 years old. A large portion (43%) had attained a 4-year college degree or the equivalent. The majority (74%) of participants were currently using a gamified app, compared to those who had used an app in the last three months but were no longer currently using that app (26%).

The use of gamified apps in the health context was predominantly voluntary (96%). A wide variety of gamification applications were used by the sample (see Table 7), however, some apps were more popular than others with 28.7% of apps used by less than 10 participants. The most common app was Pokémon Go (35.9%), followed by Fitbit (17.9%), Fitocracy (7.2%) and Super Better (5.8%). Fitbit and Fitocracy offer similar services to users, providing virtual rewards and feedback for exercise activity tracked though a specialised wearable technology or the users phone respectively. Super Better offers a slightly different service, rather than tracking activity directly, it allows users to create a to-do list and provides virtual rewards and feedback when users self-report the activities as completed. Pokémon Go, in contrast, rewards exercise activity indirectly. Players are rewarded for collecting, upgrading and battling virtual pet 'Pokémon', however, this process involves physically moving through the real world with augmented reality features providing virtual rewards and feedback. This necessitates physical activity and indirectly supports exercise outcomes.

Table 7: Health context gamification app distribution

App Name	Frequency	Percentage
Pokémon Go	80	35.9%
Fitbit	40	17.9%
Fitocracy	16	7.2%
Super Better	13	5.8%
Habitica	10	4.5%
Zombies, Run!	9	4.0%
Nike +	7	3.1%
Task Hammer	4	1.8%

Note: Apps with less than four users excluded from this table.

5.4.1.4 Descriptive analysis and test of discriminate validity

Means, standard deviations, Cronbach's Alpha coefficients and correlations were calculated for each factor (see Table 8). All scales demonstrated acceptable internal consistency reliability ($\alpha > .7$). Given the high correlation between autonomy and competency needs satisfaction factors ($r = .74$, $p < .001$) within the PENS scale, average variance extracted (AVE) and maximum shared variance (MSV) was calculated to assess discriminant validity (Fornell & Larcker, 1981). As the AVE for both autonomy (AVE: .57) and competency (AVE: .66) was less than the MSV for both factors (MSV: .84), discriminant validity could not be established. The autonomy and competency needs factors were therefore combined into the "CET needs satisfaction" factor to reflect their association within the SDT sub-theory CET (as discussed in the section 5.5).

Table 8: Health context means, standard deviations, and latent construct correlations

	Alpha	Mean	SD	1	2	3	4	5	6	7	8
1 Identified	.79	5.18	1.14	1							
2 Introjected	.85	3.20	1.61	.37*	1						
3 External	.87	3.27	1.72	.14*	.58*	1					
4 Autonomy	.75	5.46	0.97	.61*	.17	-.04	1				
5 Competency	.83	5.41	1.09	.68*	.11	-.02	.74*	1			
6 Relatedness	.89	4.47	1.53	.68*	.37*	.41*	.45*	.48*	1		
7 Intrinsic	.87	5.55	1.08	.47*	-.05	-.07	.69*	.73*	.45*	1	
8 Intention	.85	5.57	1.20	.55*	.14	-.07	.67*	.71*	.45*	.76*	1

* Significant at $p < .01$

Participant data showed relatively high average use intention of gamified apps for health (M = 5.57, SD = 1.2), intrinsic motivation (M = 5.55, SD = 1.08) and perceived autonomy support (M = 5.46, SD = 0.97). Participants also indicated relatively low perceptions of controlling aspects in their gamification experience, with most not identifying with the introjected regulation style (M = 3.20, SD = 1.61) and external regulation style (M = 3.27, SD = 1.72).

5.4.1.5 Measurement model analysis

Before conducting hypothesis testing on the full structural model, the measurement model was first tested in AMOS 24.0 to ensure a good fit to the data (Kline, 2011). This measurement model included 24 variables representing the 7 latent factors: Identified, Introjected and External Regulation, CET Needs Satisfaction (comprised of the combined Autonomy and Competency Satisfaction variables as discussed in Section 5.4.4), Relatedness Satisfaction, Intrinsic Motivation and Use Intention. Due to the non-normality of the data as specified in Section 5.4.1.2, a bootstrap procedure based on 500 bootstrap samples and a 95% bias-corrected confidence interval was undertaken on the measurement model as recommended by Byrne (2016).

Model fit was assessed through the chi-square statistic (χ^2) as well as global fit indices and incremental fit indices to better establish acceptable model fit (Markland, 2007). Results showed acceptable fit, with the following goodness of fit statistics: $\chi^2(235) = 493.18$ $p < .001$, comparative fit index (CFI) = .90, standardised root mean square residual (SRMR) = .07, and root mean square error approximation (RMSEA) = .07 [.06, .08] (Kline, 2011).

5.4.1.6 Structural equation modelling and hypothesis testing

After model fit was confirmed, SEM using the maximum likelihood method, a bootstrap procedure based off 500 bootstrap samples and a 95% bias-corrected confidence interval, was used to examine the structural model proposed by the hypotheses.

Standardised path coefficients and significance levels are presented below as Figure 3.

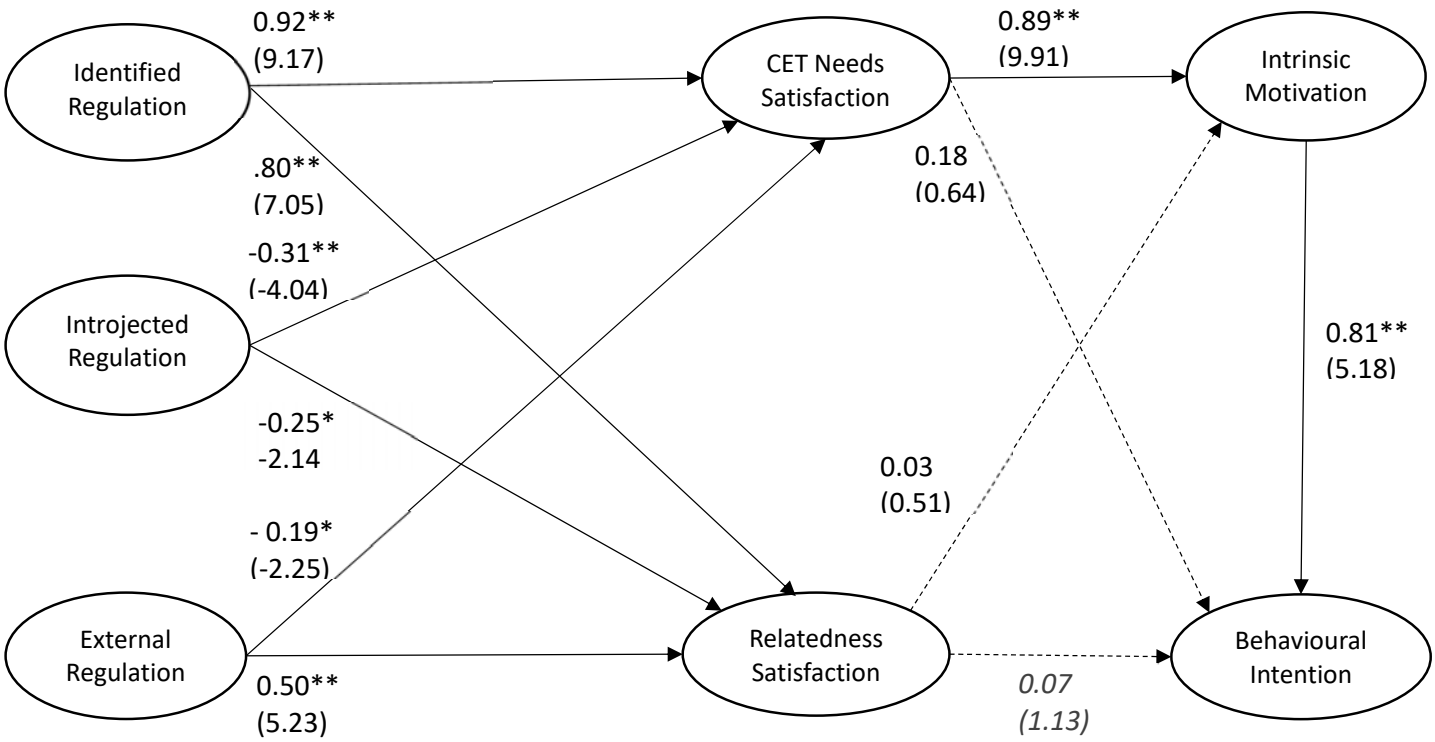


Figure 3: Health research model of gamification use intention and antecedents
$\chi^2(235) = 493.18$, $p < .001$, CFI = .90, SRMR = .07, and RMSEA = .07 [.06, .08]
Note. ** significant at *p*-value < .001; * significant at *p*-value < .05;
t-values in parentheses with standardised coefficient above; insignificant paths are dotted

Participants who reported that the gamified app they used satisfied their CET needs (autonomy and competency) exhibited higher levels of intrinsic motivation (γ = .89, *t* = 9.91, *p* < .001) toward using the gamified app, supporting H1. The satisfaction of relatedness needs, however, did not impact intrinsic motivation (γ = .03, *t* = 0.51, *p* = .51). Consequently, the data partially supports H1.

The gamification application's satisfaction of CET needs (autonomy and competency) (γ = .18, *t* = 0.64, *p* = .52) or relatedness needs (γ = -.07, *t* = -1.13, *p* = .26) did not directly impact participants' intentions to use the gamified app. This suggests that CET needs satisfaction indirectly influences behavioural intention through intrinsic motivation, supporting the mediation hypothesis H2a. Intrinsic motivation positively influenced participants' intention to use the gamified app (γ = .81, *t* = 5.18, *p* < .001), supporting H2b.

Introjected regulatory style was negatively associated with both CET needs satisfaction (γ = -.31, *t* = -4.04, *p* < .01) and relatedness needs satisfaction (γ = - .25, *t* = - 2.14, *p* = .03). External regulatory style was also associated with lower levels of CET needs satisfaction from the gamified app (γ = - .19, *t* = - 2.25, *p* = .02). However, external regulatory style was significantly related to higher relatedness needs satisfaction (γ = .50, *t* = 5.30 *p* < .01). As such, H3 was partially supported by the research.

Lastly, participants who reported higher levels of an identified regulatory style when using the gamification application also reported higher levels of both CET needs satisfaction (γ = .92, *t* =9.17, *p* < .01) and relatedness needs satisfaction (γ = .80, *t* =7.05, *p* < .01) from the gamified app, supporting H4.

5.4.2 Business context

5.4.2.1 Data cleaning

As with the previous context, before analysis was undertaken on the business context data, the data set was first checked to ensure that participants met the inclusion criteria. Of the original 310 participants, 10 were excluded for identifying a non-business-related app (as with the health context, common apps excluded included non-gamified mobile games, but also included a range of non-business apps such as Fitbit and Nike+) and a further 9 excluded for anomalous strings of identical answers indicating data entry errors or possible satisficing. This resulted in a final sample of 291, which met the accepted minimum size (n = 200) for SEM (Kline, 2011).

5.4.2.2 Assessment of normality and common method bias

Given that the dataset for the business context was below 2000 elements, univariate normality was assessed via Shapiro-Wilk test (Kelloway, 1995). As with the health context data, significant departures from normality were observed across all tested variables at the p < .05 (two-tailed) significance level. However, only behavioural intention showed skewness or kurtosis levels beyond +/- 1.0 (skewness -0.78 [0.14], kutosis 1.08 [0.29]). As this indicates a minimal overall effect of non-normality on the data (Muthén & Kaplan, 1985), no transformations of the variables were undertaken. A bootstrap procedure, based on 500 bootstrap samples and a 95% bias-corrected confidence interval, was performed on the measurement model to account for the presence of non-normal variables (Byrne, 2016).

To measure the impact of common method bias, Harman's single factor test was preformed to assess how much variation in the model is explained by common instrumentation (Chang, Van Witteloostuiin & Eden, 2010). This test returned a single factor with an explained variance of 30.29%. As this result was lower than 50%, common method bias was considered acceptable and so no additional controls beyond assessments of model fit were used (Chang, Van Witteloostuiin, & Eden, 2010).

5.4.2.3 Sample characteristics

Of the 291 participants in the business context, 32% were female, 68% were male and 0% non-binary/unspecified. The mean age of participants was approximately 31 years old, with a range of 19 to 62 years old. Almost half (46%) had attained a 4-year college degree or the equivalent. The most common industries in which gamified app were used were information (17%), education services (12%), and finance or insurance (9%). Application use was predominantly voluntary (88%). The majority (75%) of participants were currently using a gamified app, compared to those who had used an app in the last three months but were no longer currently using that app (25%).

Improving productivity (32%) was the most common reason for using the gamified app, followed by tracking task completion/compliance (19%) and education/training (16%). There was a wide variety of apps in use by the sample (see Table 9), with the majority (58.8%) of applications used by less than 10 participants. The most common application was Habitica (21.6%), followed by Epic Win (4.8%).

Both Habitica and Epic Win gamify task completion through the mechanics of a Role Playing Game (RPG), rewarding players with virtual items and the ability to customise a digital avatar upon self-report of completing tasks on a user created to-do list. Because this to-do list allows for easily customised goals, they are attractive to a diverse range of organisations (Strohmeyer, 2014). Habitica in particular offers corporate plans that provide managers tools to customise, measure and direct task completion (Habitica, 2018).

Table 9: Business context gamification app distribution

App Name	Frequency	Percentage
Habitica	63	21.6%
Epic Win	14	4.8%
To-Doist Karma	11	3.8%
Task Hammer	11	3.8%
Super Better	11	3.8%
Mind Bloom	10	3.4%
Doable	6	2.1%
Fortune City	5	1.7%
Devhub	5	1.7%
Duolingo	5	1.7%
Litmos	4	1.4%
Keas	4	1.4%

Apps with less than four users excluded.

5.4.2.4 Descriptive analysis and test of discriminate validity

Means, standard deviations, Cronbach's Alpha coefficients and correlations were calculated for each factor (see Table 10). All scales demonstrated acceptable internal consistency reliability ($\alpha > .7$). As with the health context, strong correlation between autonomy and competency needs satisfaction factors within the PENS scale were observed ($r = .77$, $p < .001$) threatening discriminate validity. Average variance extracted (AVE) and maximum shared variance (MSV) were calculated, and as both autonomy (AVE: .53) and competency (AVE: .54) showed higher AVE than the MSV for both factors (MSV: .97), discriminant validity could not be established. Consistent with the health context model, autonomy and competency needs factors were therefore combined into the "CET needs satisfaction" factor to reflect their association within CET (as discussed in the section 5.5).

Table 10: Business context means, standard deviations, and latent construct correlations

	Alpha	Mean	SD	1	2	3	4	5	6	7	8
1 Identified	.73	5.15	1.08	1							
2 Introjected	.86	3.60	1.59	.21*	1						
3 External	.83	3.97	1.58	.24*	.58*	1					
4 Autonomy	.77	5.35	1.01	.57*	.03	.02	1				
5 Competency	.77	5.37	0.97	.56*	.03	.03	.77*	1			
6 Relatedness	.81	4.84	1.25	.60*	.34*	.42*	.53*	.53*	1		
7 Intrinsic	.73	5.32	0.98	.58*	.05	.04	.68*	.66*	.50*	1	
8 Intention	.78	5.47	0.94	.56*	.07	-.05	.71*	.66*	.42*	.67*	1

* Significant at $p < .01$.

As in the case of the health context, participants in the business context exhibited largely positive perceptions of their gamified apps, with positive average use intention (M = 5.47, SD = 0.94). However, measures of externalised motivation styles such as external regulation (M = 3.97, SD = 1.58) and introjected regulation (M=3.60, SD = 1.59) were slightly more clustered around 'neither disagree nor agree' than in the health context. These differences are discussed further in section 5.5.

5.4.2.5 Measurement model analysis

To ensure that the measurement model demonstrated good fit to the data before undertaking analysis of the full structural model, analysis was performed in AMOS 24.0 (Kline, 2011). As with the health context, this measurement model comprised of 24 variables representing the previously identified 7 latent factors. Bootstrapping via 500 bootstrap samples and a 95% bias-corrected confidence interval was undertaken to account for the non-normal distribution of data (Bryne, 2016).

Model fit was assessed through the chi-square statistic (χ^2) as well as global fit indices and incremental fit indices to better establish acceptable model fit (Markland, 2007). Results showed acceptable fit, with the following goodness of fit statistics: $\chi^2(238) = 478.71$ $p < .001$, comparative fit index (CFI) = .93, standardised root mean square residual (SRMR) = .06, and root mean square error approximation (RMSEA) = .06 [.05, .07] (Browne & Cudeck, 1993).

5.4.2.6 Structural equation modelling and hypothesis testing

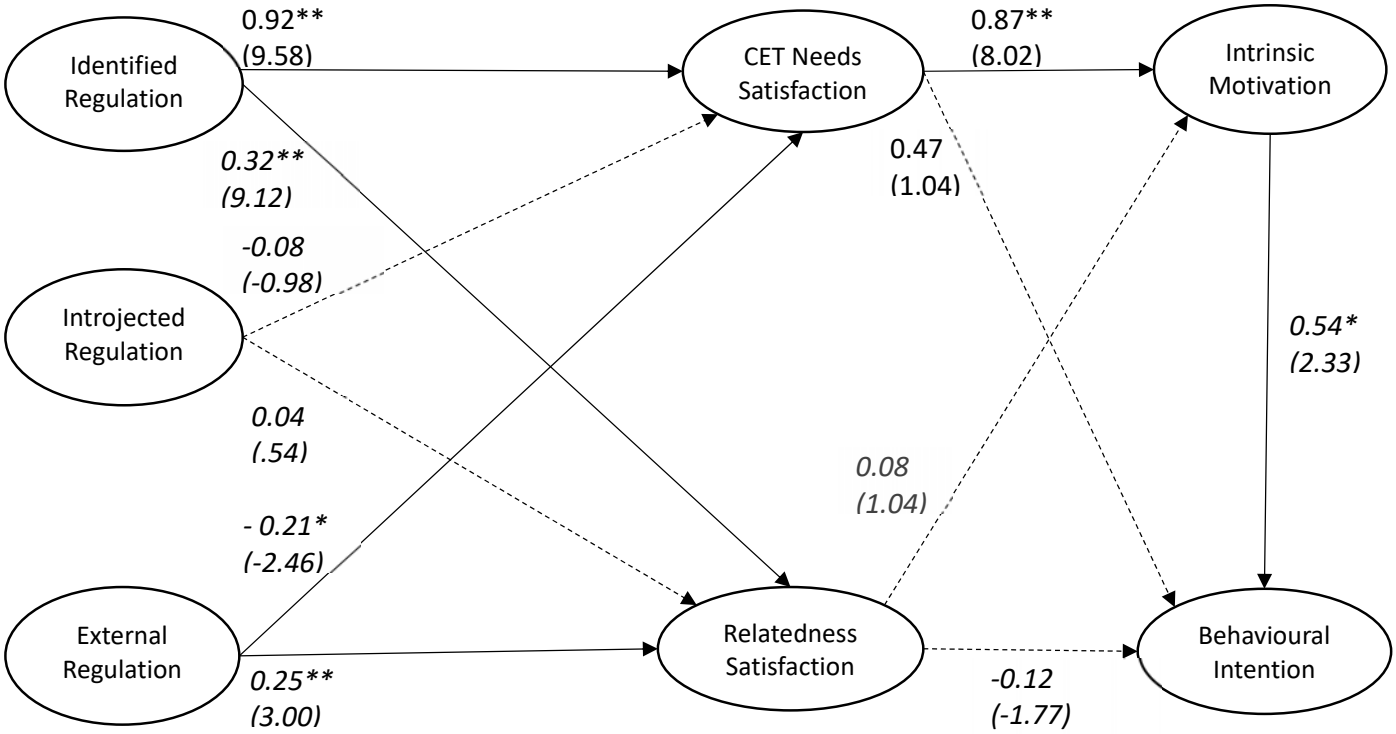
Following confirmation of model fit, SEM via maximum likelihood method with a bootstrap procedure based off 500 bootstrap samples and a 95% bias-corrected confidence interval, was undertaken to examine the structural model proposed by the hypotheses.

Standardised path coefficients and significance levels are outlined below as Figure 4.

Satisfaction of CET needs (autonomy and competency) was positively associated with intrinsic motivation ($\gamma = .87$, $t = 8.03$, $p < .001$) towards the gamified app, supporting H1. Relatedness needs satisfaction, however, was not significantly associated with intrinsic motivation ($\gamma = .08$, $t = 1.04$, $p = .50$). Consequently, this research partially supports H1.

Satisfaction of both CET needs ($\gamma = .47$, $t = 1.04$, $p = .29$) and relatedness needs ($\gamma = -.12$, $t = -1.77$, $p = .08$) was not directly associated with use intention. However, intrinsic motivation was significantly associated with use intention ($\gamma = .54$, $t = 2.33$, $p = .02$), supporting both the mediation hypothesis H2a for CET needs and the relationship hypothesis H2b.

Figure 4: Business research model of gamification use intention and antecedents



$\chi^2(238) = 478.71$, $p < .001$, CFI = .93, SRMR = .06, and RMSEA = .06 [.05, .07]
Note. ** significant at *p*-value < .001; * significant at *p*-value < .05; *t*-values in parentheses with standardised coefficient above; insignificant paths are dotted

External regulatory style was negatively associated with CET needs satisfaction (γ = - .21, *t* = -2.46, *p* = .01), however, it was also positively associated with relatedness needs satisfaction (γ = .25, *t* = 3.00 *p* < .01). Introjected regulation was not significantly associated with either CET needs satisfaction (γ = -.08, *t* = -.97, *p* = .33) or relatedness needs satisfaction (γ = .04, *t* =.54, *p* = .59). As such, H3 was partially supported by the research.

Finally, identified regulatory style was positively associated with both CET needs satisfaction (γ = .92, *t* =9.58, *p* < .01) and relatedness needs satisfaction (γ = .32, *t* =9.13, *p* < .01), supporting H4.

5.5 Discussion

While the structural model proposed by Study One and tested in Study Two demonstrated good fit to data in both contexts, some differences and unexpected results emerged in these settings. First was the degree of correlation between autonomy and competency satisfaction, resulting in their merging into the composite "CET Needs" variable. Merging of variables is often necessary to improve model fit in SEM when discriminate validity cannot be established (Fornell & Larcker, 1981; Kline, 2011). The name of this variable reflects the SDT sub theory CET, which suggests that intrinsic motivation is most closely related to the experience of competency and autonomy satisfaction (Deci & Ryan, 1985; Frederick & Ryan, 1995). The degree of correlation is somewhat expected given that gamified apps typically employ a range of game mechanics in order to motivate behaviour change (Hamari, Koivisto, & Sarsa, 2014; Nacke & Deterding, 2017), and so a gamification product that employs game design principles to achieve satisfaction of autonomy needs is likely to also incorporate game mechanics able to satisfy competency needs and vice versa (Pavlas, 2010). However, while game design principles may result in the satisfaction of autonomy and competency to such a degree as to result in the observed correlation, the lack of such a relationship with relatedness satisfaction may be explained by the limited use of relatedness supportive features in many gamification apps (Ryan et al., 2006). That past studies have been better able to establish discriminate validity between autonomy and competency may be a result of their manipulation of specific gamification elements (Mekler et al*.,* 2017) to thus avoid the correlation brought about by game design principles being employed across multiple game mechanics.

Measures of externalised motivation styles such as external regulation and introjected regulation were clustered around 'neither disagree nor agree' in the work context, but clustered around 'somewhat disagree' in the health context. This indicated that participants in the workplace context were somewhat more influenced by externalised regulation styles that in those in the health context. While the limited numbers of non-voluntary users of

gamification apps precluded statistical analysis of the impact of voluntary/non-voluntary use as a variable within the model, there was a higher proportion of non-voluntary users in the workplace context (88 v 96). These findings seem to support the findings of previous studies that indicate that workplaces are often more externally regulated than other contexts (Gerhard & Fang, 2015). These differences may have resulted in the differences observed in the measurement model. Introjected regulation (regulation through limited internalised social pressure) was found to negatively affect both CET and relatedness needs satisfaction in the health setting but had no significant associations within the workplace context. This suggests that in a workplace setting, motivators such as guilt or social pressure do not undermine needs satisfaction in the way that they do in a health context. The absence of this negative relationship in the workplace context was unexpected given previous research into the associations between extrinsic motivation and needs satisfaction (Deci & Ryan, 2008b; Deci & Ryan, 1985). However, while controlling regulation styles such as external and introjected regulation have been seen to undermine needs satisfaction in exercise and healthcare (Ryan et al., 2008; Williams et al., 1996), previous research into the workplace context has also shown a lack of statistical significance (Gagné et al., 2010). It has been suggested that in the workplace, controlled motivation is so prevalent that observing the negative impacts of extrinsic motivation such as introjected regulation might be difficult, as users have grown accustomed to the presence of the motivation and so do not report its influence accurately (Gagné et al., 2010). While the differences between the workplace and health contexts in terms of their responses to the multidimensional work motivation scale were relatively minor, the distorting impact of reference groups (Heine et al*.,* 2002), particularly when multivariate normally is violated (Lubke & Muthén, 2004), makes direct comparison difficult. Given the differences observed in their descriptive statistics and the findings of past research (Gagné et al., 2010; Gerhard & Fang, 2015), it is possible that the difference in motivational styles between contexts is larger than the descriptive data would indicate and may have influenced the significance of the relationship between need satisfaction and introjected regulation in the workplace condition.

Taken into consideration with the negative associations between external regulation and CET needs satisfaction in both contexts, this finding provides partial support for H3. Interestingly—and contrary to expectations— external regulatory style was positively associated with relatedness needs satisfaction. This suggests that there may exist a connection between the degree to which participants felt their behaviour was controlled through external forces such as social pressure and the degree of meaning they perceived in the relationships they formed through the app. While this may indicate relatedness scale issues were misinterpreted (a common issue with relatedness items in video game research, see Ryan et al., 2006), it could also indicate a sense of comradery amongst gamified app users. For instance, users may feel more bonded to other users if they feel they share an experience of being pressured to use the same gamified app.

The results showed positive associations between the composite autonomy and competency needs satisfaction factor 'CET Needs Satisfaction' and the intrinsic motivation to use the gamified app. This finding supports H1 and is consistent with previous research into CET (Arshadi, 2010; Schneider & Kwan, 2013) and specifically the role of SDT in video game contexts (Ryan et al., 2006). However previous, CET research in gamification has yielded mixed results with prior research not establishing significant relationships between intrinsic motivation and competency needs satisfaction (Mekler et al., 2017) or autonomy needs satisfaction (Sailer et al., 2017). On explanation may be found in the large majority of participants that reported voluntary gamified app use, in comparison to enforced use typical in previous experimental conditions (e.g. Mekler et al., 2017; Sailer et al., 2017). It may be that this limit on contextual autonomy could be influencing the result. That is, when gamification use is prescribed, thus restricting autonomy from the outset, the capacity for gamification to satisfy autonomy needs may be compromised.

This study also shows that relatedness needs satisfaction did not influence participants' intrinsic motivation to use the gamified app, thus resulting in H1 being only partially supported despite the positive relationships between intrinsic motivation and both

competency and autonomy needs satisfaction. This finding contrasts with previous research that shows positive links between relatedness and intrinsic motivation in both video game (Ryan et al., 2006) and gamification (Sailer et al., 2017) contexts. In general CET research suggests that psychological needs satisfaction contributes to intrinsic motivation, and failure to satisfy these needs undermines intrinsic motivation (Grolnick & Ryan, 1989). However, it is important to note that a key component of CET research is that intrinsic motivation is most strongly linked to autonomy and competency needs satisfaction (Deci & Ryan, 1985), and so the non-significance relationship between relatedness satisfaction and intrinsic motivation is not necessarily in conflict with CET. It is also possible that this result is owing to the fact that the most popular apps in the sample (with the notable exception of Pokémon Go) have limited mechanical support for relatedness (through features such as narrative, teammates, or communal goal sharing [Ryan et al., 2006; Sailer et al., 2017]).

Critically, this study shows that intrinsic motivation positively influences behavioural intention and mediates the effect of autonomy and competency needs satisfaction on intention, supporting both H2a and H2b. This finding is consistent with the substantive body of research demonstrating the links between intrinsic motivation and behavioural pull (Grant, 2008; Ryan et al., 1997). It also provides additional support for the use of CET in gamification by demonstrating a similar mediation of needs satisfaction via intrinsic motivation on behaviour as has been observed in the video game context (Ryan et al., 2006).

Finally, the internalised regulatory style of identified regulation was positively associated with psychological needs satisfaction in line with the predictions made from OIT (H4). This finding suggests that when a user identifies with the value provided by a gamified app, they are more likely to feel as through the app supports their autonomy, competence and relatedness needs. This is significant given the links in this research between needs satisfaction and behaviour through intrinsic motivation.

5.6 Implications

This study provides further support for the use of SDT in gamification research by demonstrating the associations between intrinsic motivation and behavioural intention across both workplace and health contexts. This finding suggests that designing gamified apps to be both enjoyable and interesting will be key to their sustainability and efficacy across multiple contexts. This study also supports the utility of CET as a foundational theory for explaining how gamification can be better designed to be enjoyable and interesting, by establishing associations between autonomy and competence needs satisfaction and behavioural intention through intrinsic motivation. From a practical perspective, this suggests that social marketers should utilise game design mechanics that support autonomy and competency needs satisfaction to enhance their intervention's behavioural impact. Peng and colleagues (2012) found that player choice through features such as avatar customization or dialog options positively affected autonomy needs satisfaction. Sailer and colleagues (2017) suggest that feedback mechanisms such as badges, leaderboards, and performance graphs positively affect competence needs satisfaction. This study would therefore tentatively support the use of these features to facilitate intrinsic motivation through autonomy and competency needs satisfaction. However, the limited extant literature that examines these game mechanics individually makes assessing the exact relationship between these features, intrinsic motivation and contextual factors difficult (Hamari et al., 2014; Seaborn & Fels, 2015). This study therefore echoes the calls for additional research into the specific game design mechanics that facilitate needs satisfaction.

Importantly this study also addresses the call for further research into the role of extrinsic motivational context on gamification outcomes (Deterding, 2011). Further, through the identification of extrinsic factors that undermine needs satisfaction this study highlights the limitations of previous, exclusively CET focused research and suggests that theory use must be broadened to capture the impact of these extrinsic factors. It provides empirical support for the use of OIT to accomplish this theory expansion, demonstrating this theories capacity

to explain the influence of both internalised and externalised extrinsic motivations on needs satisfaction, intrinsic motivation and behavioural outcomes. This study suggests that sources of externalised regulation, such as extrinsic (rewards and punishments) and introjected (guilt and social pressure) regulation, negatively impact on autonomy and competency satisfaction. However, context may moderate this relationship given the lack of significant impact of introjected regulation within the workplace context. The use of OIT may therefore be critical in explaining the mixed results of gamification on autonomy and competency in previous studies such as those by Hanus and Fox (2015) and Mekler et al. (2017). Given the role of externalised regulation on needs satisfaction within the present study, this suggests the reason for the mixed results of previous research may stem from a failure to include empirical measures of extrinsic motivation in the studies. Although this finding will need to be replicated, the suggested relationship provides an avenue for deeper understanding of the links between artifactual affordance through gamification design and contextual affordance through the environment being gamified. As such this new theoretical lens may be crucial to addressing the stated need for further research into the motivation environment of gamification users as first suggested by Deterding (2011).

Consistent with OIT, this study also found that internalised sources of extrinsic motivation (such as identified regulation, in the form of personal goals and identified value) positively influenced needs satisfaction. This suggests that when users perceive a gamified app as providing them with benefits that are of personal value to them, they perceive that app to be supportive of needs satisfaction. This is of theoretical significance as it suggests that not all sources of extrinsic motivation are detrimental to gamification outcomes, a common assumption in gamification research (e.g., Hanus & Fox, 2015; Korn & Schmidt, 2015), and that if aligned through the goals and beliefs of users can actually be positive to the gamification experience. Practically this implies that gamification designers should pay close attention to how their apps convey and communicate their benefits to users. For example, rather than a gamified app being designed to better monitor task adherence, its design (and in particular how these benefits are communicated to users) should focus on making the target behaviour easier and more rewarding, with these rewards communicated to the user

in ways that align with their existing goals and values.

While these findings largely support the use of gamification to incentivise behaviour with positive outcomes across contexts, they also present important implications for the ethics of gamification use. By highlighting the potential for gamification to undermine needs satisfaction through externalised regulation styles, this study supports the call of researchers such as Hanus and Fox (2015) and Korn and Schmidt (2015) to explore in greater depths the potential negative consequences of gamification. Given the importance of needs satisfaction to psychological health (Deci & Ryan, 2008a; Sheldon et al., 2001), social marketers have an ethical responsibility to ensure that gamification is always undertaken from the perspective of shared value creation (Kim & Werbach, 2016).

5.7 Limitations and Conclusion

A major limitation of this study is that as a survey of gamification use, data was collected from users across multiple gamified apps. In particular, the diversity of apps used and thus the small samples obtained for any one specific app prevent the statistical analysis of differences between the various apps collected. While this variety of apps assessed may have benefits to the external validity of the use intention and antecedents model across apps, without the ability to conduct valid statistical analysis between apps, the effect of the characteristics of specific apps on the key variables cannot be ascertained. This would be particularly beneficial when discussing the observed differences between contexts such as the significance of introjected regulation in the health context but not the workplace context. Without the ability to examine the impact of specific apps, it cannot be determined if this difference is due to artifactual differences between workplace and health apps or contextual differences between these contexts themselves. Given that motivation experience is dependent on both artefactual affordance and situated affordance (Deterding, 2011), as needs satisfaction arises from the interplay between external and internal factors (Deci & Ryan, 2002), future research should provide empirical measures of both these factors.

While this paper identifies extrinsic motivation, as a worthy focus of future research, the lack of multiple time points in data collection results in this study being unable to address the capacity for gamification to support changes in how external motivation is perceived and internalised. Longitudinal research is therefore needed to address the ongoing question of whether gamification can support changes in how an individual perceives their existing motivation environment (Hanus & Fox, 2015). Additionally, while the focus on ongoing and recent users of gamification was undertaken to reduce recall bias, it has the limitation of excluding data from individuals who may have been unhappy with their gamified app resulting in a selection bias and skewing the data towards positive results. Given that there is an already established positive result bias in gamification research owing to limited empirical examination of negative variables (Bogost, 2013, Kim & Werbach, 2016, Lewis et al., 2016), future research should incorporate larger samples of lapsed users to investigate the differences between current and past users of gamification products and better identify the factors that contribute to gamification cessation.

While Harman's single factor test did not indicate the presence of common methods bias, the limited financial compensation and necessity of approximate answers when dealing with novel concepts such as regulation styles and Likert scales has likely resulted in some degree of satisficing behaviour from participants (MacKenzie & Podsakoff, 2012). This behaviour is likely to lead to less effort expended and thus less accurate answers provided, resulting in common methods bias (Krosnick, 1999). While Harman’s single factor test can provide some support that this has not negatively limited the findings of this research (Chang, Van Witteloostuiin, & Eden, 2010), future research should seek to reduce the likelihood of satisficing behaviour through the incorporation of multiple time point data collection strategies, shorter and more focused questionnaires, and more detailed explanations of novel concepts (MacKenzie & Podsakoff, 2012).

Overall, by employing OIT, this paper contributes towards a greater understanding of how extrinsic motivation can impact on gamification outcomes, addressing the call for research into contextual motivation factors in the gamification literature (Mekler et al., 2017; Mitchell et al., 2017). By highlighting the negative relationships between both external regulation (reward and punishment) and introjected regulation (guilt and social pressure) on autonomy/competency satisfaction, this paper provides empirical evidence for the role of situated affordance in explaining negative gamification outcomes. Furthermore, by demonstrating the positive relationship between identified regulation (alignment with goals and values) and needs satisfaction, this paper builds support for the use of OIT in understanding gamification outcomes. Unexpected positive relationships between external regulation and relatedness needs satisfaction, however, highlights the need for more context focused research in the future.

Chapter 6: Discussion and Conclusion

This chapter revisits the purpose of this thesis and outlines how the previous two chapters (Chapter 4 and Chapter 5) jointly address the research questions of the research. It also presents how these findings provide practical and theoretical implications, while identifying the limitations of the overall research program and how future research can build on these findings. This is done with regards to the research as a whole, rather than the previous chapters which outlined the implications and limitations of each study individually.

Section 6.1 revisits the research purpose, providing a summary of the research questions and design. The following Sections 6.2, 6.3 and 6.4 provide a discussion of the results that address each of the three sub-research questions across the two studies of this thesis. Section 6.5 summarises the results that jointly address the overall research question. The theoretical and practical implications of the findings of this thesis are outlined in Section 6.6 and 6.7 respectively. The limitations of this research program are addressed in Section 6.8, followed by directions for future research in Section 6.9. This thesis is then concluded in Section 6.10.

6.1 Revisiting the Research Purpose and Design

This research is focused on informing the design of actual products for social marketing interventions, diverging from the extant literature's focus on purely behavioural social marketing core products and addressing the call for a greater focus on the product component of the marketing mix (Edgar et al., 2017). Given the increasing reliance of social marketers on digital products (Whittaker, 2012), owing to their cost efficiency (Akter & Ray, 2011; Lefebvre, 2009) and increased consumer access to technology (Anderson, 2019), this research focused on the emerging digital product of mobile phone-based gamification applications (gamified apps). While a growing body of research supports the use of gamification across a variety of social marketing contexts (see Hamari et al., 2014), there remains scope to improve understanding of how gamification achieves outcomes and factors contribute to its success (Nacke & Deterding, 2017). To address this gap and contribute to a greater understanding of gamification in both commercial and social marketing contexts the

overall research question (ORQ) was developed:

What are the key determinates of consumers' use of gamification products?

In addressing this ORQ. past gamification research has largely focused on artifactual affordance, or the features of the gamification product itself that contribute to motivational outcomes (Deterding, 2011). However, critical evaluation of this extant research has highlighted that while this focus has yielded several interesting observations and cemented the importance of Self-Determination Theory (SDT) in understanding gamification outcomes (Deterding, 2015; Seaborn & Fels, 2015), there are several major limitations to this approach. While SDT has provided a good lens through which to understand how gamification can bring about behavioural change through the intrinsically motivating satisfaction of autonomy and competency needs (Pe-Than et al., 2014; Peng et al., 2012), it has not proven adequate to explain why some gamification interventions have behavioural impact despite not influencing consumers' intrinsic motivation (Mekler et al., 2017; Mitchell et al., 2017) or why gamification in some contexts has been shown to undermine intrinsic motivation (Hanus & Fox, 2015). It has therefore been suggested that the role of extant theory in gamification research may need to be critically examined with a greater focus on the relationship between situated affordance, or the features of the context being gamified, that contribute to motivation outcomes and the experience of intrinsic motivation (Nacke & Deterding, 2017). This formed the basis of the first sub-research question (RQ1) of this thesis:

RQ1: To what extent does SDT explain consumers' use of gamification products?

A review of existing research revealed that the current body of literature, in its focus on artifactual affordance, has concerned itself primarily with the relationships between specific game mechanics and psychological needs satisfaction. Because of this, the literature has largely ignored the potential of psychological mediators to change the way that gamification is experienced and does not examine the impact on behaviour between different contexts or individuals. An extension to SDT may therefore be necessary to identify and measure these

psychological mediators to gain a better understanding of gamification outcomes (Deterding, 2015; Nacke & Deterding, 2017; Mekler et al., 2017; Mitchell et al., 2017). The literature review suggested that organismic integration theory (OIT), a sub-theory of SDT (Deci & Ryan, 1985), would provide a suitable lens through which to operationalise measures of extrinsic motivation (or motivation external to the behaviour being engaged in, such as rewards/punishment or social pressure). Critically, rather than viewing extrinsic motivation as a dichotomous opposite to extrinsic motivation, OIT categories types of extrinsic motivation by how internalised they are to an individual and posits that the more internalised the motivation, the greater impact it will have on positive psychological and behavioural outcomes (Deci & Ryan, 2002). Understanding the role that OIT plays in explaining gamification outcomes is therefore of great interest to social marketers who often operate within environments rich in externalised motivation (Dibb & Carrigan, 2013; Hastings, 2003, 2007) and seek to promote the internalisation of societal motivations (Andreasen, 2003; Orleans, 2000). Consequentially, to expand the scope of gamification research and address the overall research question, the second sub-research question (RQ2) of this thesis was developed:

RQ2: To what extent does OIT explain consumers' use of gamification products?

To address these questions, the research examined the determinates of mobile-based gamified app use owing to this best reflecting the way in which gamification is typically implemented in social marketing contexts (Lister et al., 2014). This approach also provided field data on naturalistic gamification use as has been called for in the literature (Deterding, 2014; Seaborn & Fels, 2015). This was accomplished through a two-study, mixed-method approach. Study One clarified the area of inquiry and provided an enriched understanding of the determinates of gamification use and maintenance through qualitative semi-structured interviews. Integrating the insights of this study, a model of how extrinsic motivation, as understood through OIT, impacts on gamification's motivational outcomes was produced and then quantitatively tested through Study Two. This study involved the separate collection of data from the physical activity context and from the workplace context via quantitative online survey, which was then analysed through Structural Equation Modelling (SEM) to

evaluate the robustness of the model. The following sections delineate how the findings of these two studies addressed the research questions of this thesis.

6.2 Addressing Research Question 1

To what extent does SDT explain consumers' use of gamification products?

Both the qualitative Study One and quantitative Study Two provide support for the proposition that the satisfaction of psychological needs is associated with intrinsic motivation, and that this motivation predicts behavioural intention. The qualitative Study One highlighted the association between artifactual components that supported needs satisfaction and the experience of needs satisfaction, for example, notification of achieving a personal best supported competency needs satisfaction. Further, this needs satisfaction was largely associated with intrinsic motivation (such as engagement and enjoyment), and through this behavioural intention. Quantitative Study Two largely supported these qualitative findings, with autonomy and competency needs satisfaction having positive associations with intrinsic motivation, which influenced behavioural intention. This is largely consistent with the central notion of SDT, that self-directed motivation is a product of needs satisfaction resulting in intrinsic motivation (Deci & Ryan, 2002). However, these studies also revealed several components of SDT that are not fully realised in the findings and require further analysis and in some cases further research to understand. These components are notable in addressing RQ1 as they either do not adequately explain consumer behaviour within gamification or are the basis for understanding conflicting results between the two studies. A discussion of these components is therefore presented in the following sections.

6.2.1 Autonomy support

The findings of Study One and Two together support the use of SDT to understand behavioural outcomes on the basis of autonomy satisfaction. First, the findings of Study One suggested that perceptions of user choice and control was associated with enjoyment, satisfaction and intention to continue use of gamification products. Conversely, users that

reported feeling constrained, or unable to use their gamification products in the way they wanted, reported dissatisfaction, reduced enjoyment and lower use intention. This was quantitatively confirmed by Study Two which demonstrated a significant positive association between autonomy satisfaction and user intention, mediated through intrinsic motivation. However, the level of correlation between autonomy satisfaction and competency satisfaction in Study Two resulted in these two theoretically distinct concepts being merged into a single compound variable. While high correlations between these variables are expected given their associations in the SDT sub-theory of Cognitive Evaluation Theory (CET) (Frederick & Ryan, 1995; Vallerand & Reid, 1984), these constructs are theoretically distinct from one another (Ryan et al., 2006). Given that the commercial gamification apps examined by this thesis typically employ a range of game mechanics in order to motivate behaviour change (Hamari, Koivisto, & Sarsa, 2014; Nacke & Deterding, 2017), it is likely that this correlation is the result of good game design principles enabling the satisfaction of both autonomy an competency needs (Pavlas, 2010). The difficulties this study had in distinguishing between these variables therefore represents a challenge to the capacity of SDT to explain gamification outcomes. Previous STD research has established the discriminate validity of autonomy and competency satisfaction as separate constructs (eg: Vlachopoulos & Michailidou, 2006; Van den Broeck et al., 2010). However, findings in some contexts, such as schools (Kröner et al., 2017) and universities (Johnston & Finney, 2010) has demonstrated similar difficulties in destabilising discriminate validity between psychological needs satisfaction. It has been suggested that this may be a result of context-specific factors amplifying common methods bias (Johnston & Finney, 2010), highlighting the need for further model refinement in gamification.

Despite this, SDT did largely provide a good lens through which to understand gamification outcomes. However, there were several results that challenged the current use of SDT in gamification research to predict responses to specific artifactual affordances. Study One highlighted that features that had been previously found to support autonomy satisfaction in gamification research, such as interactivity and customisation (Pe-Than et al., 2014; Peng et al., 2012; Ryan et al., 2006), could have an adverse effect in some contexts. The impact of

situated norms seemed to play a major role in this, with some users not wishing to engage in some interactive elements for fear of being perceived as too frivolous. While limited empirical work has been conducted into this phenomenon, Deterding (2014) has previously suggested that some non-gaming contexts such as workplaces may shun gameful experience and gameful interaction out of a desire to not be seen to be childish. Given that the SDT core concepts of needs satisfaction and intrinsic motivation primarily apply to the motivation behind choices made free from external influence (Ryan & Deci, 2017), this finding may suggest that gamification research should expand beyond the current focus on intrinsic motivation to better conceptualise these external influences. This would be particularly true in situations where such external influences are prevalent, which includes many social marketing contexts (Hastings, 2007; Thøgersen, 2005), indicating a potential limitation of using this theory to explain gamification outcomes in social marketing research.

6.2.2 Competency support

The results of both Study One and Two again support the use of SDT to understand behavioural outcomes as a result of competency satisfaction. Qualitative support came from Study One, in which participants reported that features that facilitated feelings of competency such as supportive feedback proved instrumental in the experience of intrinsic motivation and behavioural intention. The thwarting of feelings of competency was particularly impactful on intrinsic motivation and behavioural intention. This was commonly the result of unintentional features of the gamification products, such as confusing user design or bugs in the programming that limited the ability of users to interact with the product successfully. This relationship was confirmed by the quantitative Study Two, in which a significant positive association between competency satisfaction and user intention, mediated through intrinsic motivation, was observed. However, as previously highlighted, the difficulties in statistically distinguishing between autonomy and competency satisfaction in this study presents a limitation to the use of SDT to understand gamification outcomes.

While SDT proved a good theoretical lens through which to interpret user responses to

competency satisfaction, it again proved limited in its ability to predict which factors would best facilitate this satisfaction. Qualitative data from Study One highlighted that even when discussing the same gamification features, users had different perceptions of how motivationally supportive these mechanics where. For example, when discussing virtual rewards such as badges and levels some users found these features competency supportive citing feelings of achievement while others found these rewards meaningless or even patronising. The determining factors in how these artifactual affordances were interpreted seemed to be associated with perceived value, with that value determined through individual factors such as behavioural goals or positive brand associations. As an example, past positive associations with the Pokémon brand driving collection behaviour in Pokémon Go or existing fitness goals driving pursuit of personal best achievement rewards in Fitocracy. This poses a challenge to the use of SDT in understanding gamification outcomes, as a central argument to explain gamification's efficacy has been its capacity to support the satisfaction of competency needs through game mechanics (Hamari, 2013; Pavlas, 2010; Zichermann & Cunningham, 2011). If the experience of this satisfaction is depended upon pre-existing value structures than gamification may only be effective in situations where user values already align with the behavioural objectives of the gamification product. This may suggest that gamification is most effective when paired with other social marketing tools that can help align user values towards the targeted behaviour.

However, some individuals did demonstrate the capacity to internalise the artifactual affordance of virtual rewards and thus began to respond to these rewards with intrinsic motivation and competency satisfaction. For these individuals the virtual rewards began to reflect perceived personal value despite the absence of external reward or punishment or existing positive evaluations of the behavioural being gamified. That this experience wasn't universal however, suggests that the internalisation of this artifactual affordance is dependent upon some contextual factor(s) yet identified. Addressing the cause for this therefore falls outside of the scope of current SDT approaches to motivation in gamification research. This is, however, of vital importance to both SDT research and social marketing research given the importance both fields of study place on the internalisation of motivation

(Deci & Ryan, 1985; Hagger et al., 2014).

6.2.3 Relatedness support

While Study One provided good qualitative evidence for the importance of salient reference groups in supporting gamification product use, the actual experience of relatedness satisfaction through features of the gamification product was mixed. While many users reported the perceived importance of having friends and family that used the app, very few considered this a key element of their continued use of the gamification product. Features that conceptually support relatedness satisfaction such as social media integration often resulted in either apathy or negativity by users, with many finding these features too competitive. Interestingly when discussing relatedness satisfaction, most users focused on incidental sources of relatedness affordance (such as happenstance of friends and family using the app), rather than intentional mechanical features designed to support this need (such as multiplayer support).

This finding was supported quantitively, with relatedness satisfaction not having statistically significant relationships with either intrinsic motivation or behavioural intention. This finding is in contrast with previous research that showed positive relationships between relatedness and intrinsic motivation in both video game (Ryan et al., 2006) and gamification (Sailer et al., 2017) contexts. It is possible that this result was influenced by the prevalence of applications in the sample that lacked significant mechanical support for relatedness satisfaction, such as limited social features, narrative or player-to-player interaction, and this would be a common limitation of many gamification products (Sailer et al., 2017). However, it is also possible that this reflects what the SDT sub-theory CET suggests, specifically that support for intrinsic motivation from environmental stimulus (including from augmentation of the environment such as gamification) is largely a factor of autonomy and competency supportive feedback (Deci & Ryan, 1985; Reeve, 1996). Relatedness satisfaction in contrast is often conceptualised in CET through the concept of a minimum requirement rather than a contributing factor, that is, the thwarting of this needs satisfaction negatively impacts intrinsic motivation but its

presence is not as necessary for intrinsic motivation as autonomy or competency needs satisfaction (Deci & Ryan, 1985; Grolnick & Ryan, 1989). While relatedness needs satisfaction is often discussed in gamification research, and past gamification research has shown the capacity of this gamification to support relatedness needs (see Xi & Hamari, 2019), the literature has not empirically measured relatedness satisfaction in regard to behavioural outcomes. This may reflect the limited mechanical support for relatedness needs satisfaction in commercial gamification products (Sailer et al., 2017), but this may also suggest that other studies also did not find significant relationships and thus did not report on this variable owning to the established positive result bias in gamification publication (Bogost, 2013; Kim & Werbach, 2016; Lewis, Swartz, & Lyons, 2016).

An alternative conclusion to this finding however can be drawn from analysis of the qualitative findings of study one. These findings suggested that several users derived relatedness satisfaction from social interactions outside of the app, that were nonetheless related to app use such as telling friends and family about in game achievements. Taken together with the quantitative findings of study two, this may suggest that a reason for the limited associations between relatedness satisfaction and intrinsic motivation may be because of instrument design. The PENS scale used in study two assesses relatedness satisfaction through agreement with statements similar to “I found the relationships I formed in this app important” (Ryan et al., 2006). A weakness then of this scale may be that it leads responders to consider only relationships formed within the app and ignore external and pre-existing relationships, potentially confounding the relatedness variable. Further, this scale does not explicitly assess the importance of relationships with non-player characters such as virtual teammates which have been shown to positively impact of relatedness satisfaction in conjunction with other game design features (Sailer et al., 2017).

These findings therefore do not support the current stance of CET driven gamification research to ignore the relatedness variable and suggests that future research must incorporate measures of all three needs variables to better establish their roles in gamification outcomes.

In conclusion, the results of these two studies highlight that while SDT is a useful theoretical lens for interpreting the results of gamification research, the current focus on intrinsic motivational components of SDT, particularly CET, is not sufficient to predict gamification outcomes. To this end, the results of this thesis suggest that contextual and individual features such as subjective norms, personal goals, player type and perceived utility may require further research to address the limited capacity of intrinsic motivation alone to explain these elements of the findings.

6.3 Addressing Research Question 2

To what extent does OIT explain consumers' use of gamification products?

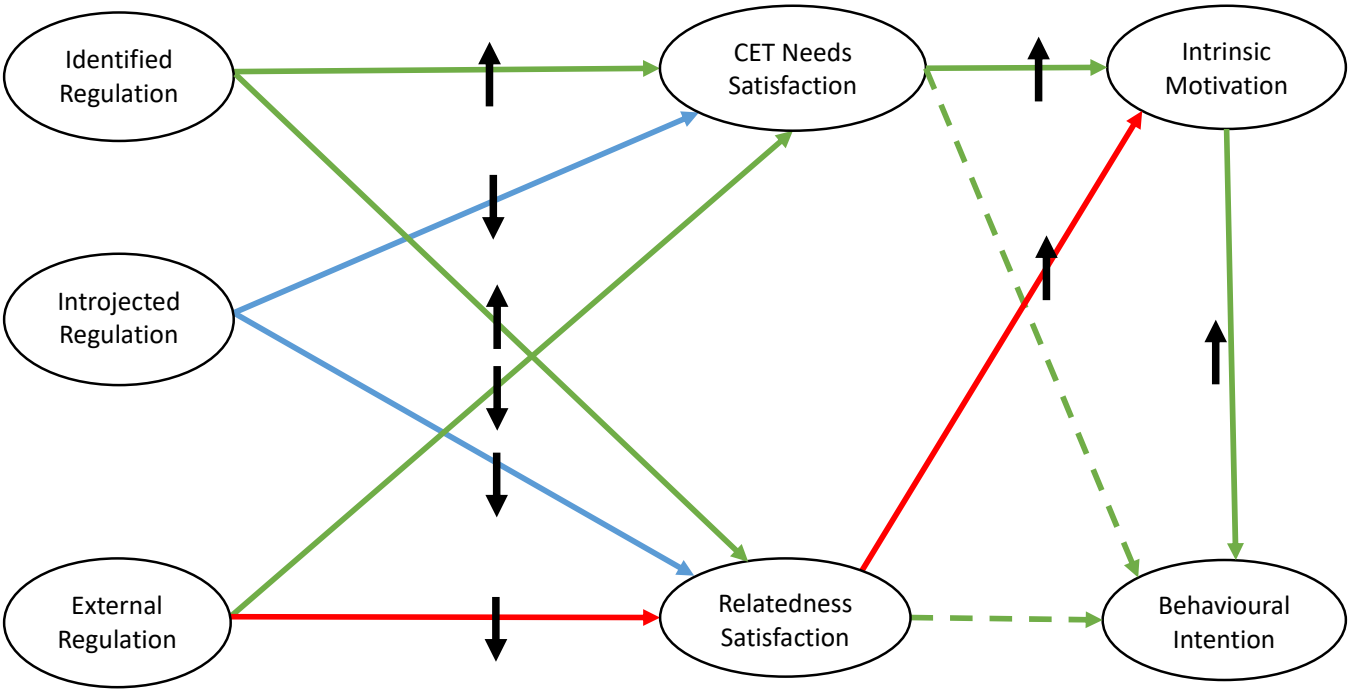
The findings of both Study One and Study Two suggest that intrinsic motivation is an insufficient explanation to gamification outcomes, in contradiction to the current focus within gamification research on intrinsic motivation (Nacke & Deterding, 2017). To expand on the use of theory in gamification research, the role of extrinsic motivation was examined through the lens of the SDT sub-theory of Organismic Integration Theory (OIT) (Deci & Ryan, 1985). The findings of these two studies mostly support the use of OIT to interpret gamification results, with the OIT concept that the more internalised sources of extrinsic regulation have greater impact on both intrinsic motivation and behavioural intention being largely supported through the quantitative results of Study Two. Study One also highlighted that OIT provided a good taxonomy to categorise many of the different sources of situated affordance identified in that study's qualitative data, identifying them as regulation styles and grouping them by relative internalisation (identified to externally regulated). Similarly, the more internalised sources of affordance had greater associations with positive behavioural and psychological outcomes of gamification use.

OIT particularly provided good insights into why some users had different responses to identical gamification features in the qualitative Study One. For example, for some users' supportive feedback was highly external to the core benefits of the behaviour resulting in an

interpretation of the feature as being externally regulated and reducing needs satisfaction. As an example, push notifications on an exercise app pestering a user to exercise more being perceived as controlling and reducing intrinsic desire to exercise. Alternatively, other users found the same game mechanic to be reflective of their own perceived utility, resulting in the feature being perceived as identified regulation and supportive of needs satisfaction. As an example, those same push notifications being perceived as a useful reminder to focus on achieving exercise goals.

While many of these relationships were supported through the quantitative results of Study Two, there existed several departures from expected results. The expected relationships are highlighted below as Figure 5, with hypothesised relationships supported by the research in green, partially supported in blue and not supported in red.

***Figure 5*: Research model of OIT predicted gamification use intention and antecedents**



Note. Hypothesised relationships supported by results marked in green, partially supported marked in blue and not supported marked in red. Hypothesised relationship direction marked with vertical arrows. Hypothesised significance indicated with unbroken lines for significant and broken for insignificant (ie, green broken line indicates relationship was correctly hypothesised to be insignificant).

These results are discussed below, categorised into the various groupings of intrinsic regulation in OIT with included discussion of the qualitative findings of Study One that may explain the observed outcomes. Overall implications of these results are discussed at the end of this section.

6.3.1 External regulation

Reflective of OIT, external regulation was negatively associated with autonomy and competency satisfaction in the quantitative Study Two. This was expected given the qualitative findings of Study One that demonstrated that game features that were perceived as being external to the core benefits of the behaviour were considered undesirable distractions. Given that many gamification features such as points and badges have been criticised for lacking relevance to users (Seaborn & Fels, 2015), these findings may highlight the importance of OIT in understanding the mixed gamification results of previous studies. For instance, in an autonomy controlling classroom setting (Hanus & Fox, 2015), game mechanics may be perceived as attempts at external regulation and largely irrelevant to personal goals and self-image, decreasing intrinsic motivation and potentially harming effort despite the positive impacts of these same mechanics in other contexts (Peng et al., 2012). This finding therefore provides support for the use of OIT in the understanding of gamification outcomes.

However, an unexpected positive association between external regulation and relatedness satisfaction was observed in both the physical activity and workplace contexts investigated in Study Two. This is unexpected, given that previous OIT research has highlighted the capacity for externally regulated affordance to undermine needs satisfaction, including relatedness satisfaction (Markland & Tobin, 2010). This finding may be the result of relatedness scale questions being misinterpreted (a common issue with relatedness items in video game research, see Ryan et al., 2006). It may also suggest that there exists a connection between perceptions of externally controlled behaviour (such as social pressure) and the meaning perceived in relationships formed through gamification such as a sense of comradery in the

shared experience of extrinsic pressures.

6.3.2 Introjected regulation

The qualitative results of Study One suggested that partially internalised social pressures manifesting as feelings such as guilt to continue gamified app use, or to use a gamified app in a particular way, resulted in lower intrinsic motivation toward using the app. This finding is reflective of the conceptualisation of introjected regulation in OIT, in which extrinsic pressure has become internally driven but not internally accepted and thus undermining needs satisfaction (Ryan & Deci, 2000).

This hypothesised negative relationship was partially supported through quantitative findings in Study Two. In the health setting, introjected regulation was found to negatively affect both autonomy/competency (CET) needs and relatedness needs satisfaction. However, in the workplace context high levels of introjected regulation were not significantly related to either autonomy/competency (CET) needs or relatedness needs satisfaction. This result is surprising given previous research associating incompletely internalised regulation styles and needs satisfaction (Deci & Ryan, 2008b). However, this finding is somewhat consistent with context specific CET research in which introjected regulation has undermined needs satisfaction in physical activity and healthcare contexts (Ryan, Patrick, Deci, & Williams, 2008; Williams, Grow, Freedman, Ryan, & Deci, 1996), while lacking statistically significant relationships with needs satisfaction in the workplace context (Gagné et al., 2010). Gagné et al. (2010) suggests that in the workplace the prevalence of controlled motivation, such as introjected regulation, is so prevalent that measuring the negative impacts of this regulation style may be difficult as workers have become so accustomed to the pressure they do not accurately report its influence. This may present a contextual limitation to the use of OIT in interpreting and predicting gamification outcomes in such contexts.

6.3.3 Identified regulation

Consistent with OIT, qualitative Study One suggested that gamification mechanics that demonstrated relevance to personally held values had much greater capacity to support needs satisfaction and intrinsic motivation. This finding was confirmed quantitatively through

Study Two which showed across both physical activity and workplace contexts positive relationships between identified regulation and both autonomy/competency needs satisfaction and relatedness needs satisfaction. As with the finding that externally regulated motivation affordance undermines needs satisfaction, the result that internally regulated motivation affordance supports needs satisfaction provides a useful theoretical lens through which to better understand existing gamification outcomes. Points, leaderboards and badges, game mechanics that have been criticised in the past for their limited capacity to create intrinsically motivating gameplay on their own (Esteves, 2017) may nonetheless support needs satisfaction when these mechanics are perceived by the user as demonstrating progress towards individual goals or valued achievements (Jung et al., 2010; Von Ahn & Dabbish, 2008). This may be a component of understanding why gamification has been shown to have behavioural impact without intrinsic motivational impact. For example, in a physical activity context (Mitchell, Schuster, & Drennan, 2016) or in voluntary human computation tasks (Mekler et al., 2015), the game mechanics could serve as clearer connection between participants' effort and their performance and may therefore support needs satisfaction without being perceived as particularly enjoyable. In this way OIT provides insight into the contextual limitations of gamification, by indicating that gamification is most impactful when the individuals targeted already positively value the behavioural benefits of gamification use. This is in keeping with how social marketing is typically used to facilitate behaviour change in an individual who has already began to contemplate the benefits of change and is looking for support (Andreasen, 2004).

Importantly, the qualitative results of Study One indicate the capacity for gamification to potentially facilitate the internalisation of extrinsic sources of motivation such as the collection of digital rewards. The conscious evaluation of these rewards (such as the collection of Pokémon in the popular mobile game Pokémon Go) could not have been influenced by pre-existing goals as these rewards exist only within the gamification product itself. Nonetheless, several participants highlighted that the conscious collection of these

virtual rewards had become a targeted goal with language such as “completing the collection” used to describe the pursuit of these rewards. This indicates the capacity of gamification to support the conscious evaluation of gamification use through gameplay features, a crucial step towards the internalisation of the targeted behaviour (Deci & Ryan, 2002). This is of significance to social marketers, as typically social marketing programs are most effective when supporting behaviour change in individuals who already consciously value the behaviour being targeted (Andreasen, 2004). If gamification can support the internalisation of motivation, then this offers the potential for social marketing to target more ‘difficult to change’ target audiences who may be less motivated to change their behaviour. Due to a lack of longitudinal data, however, this research cannot conclusively support this finding and further research needs to be conducted to confirm this finding.

6.4 Addressing the Overall Research Question: A Summary

What are the key determinates of consumers’ use of gamification products?

To address the overall research question, the following section is divided into two sub-sections. The first sub-section (Section 6.4.1) outlines the research findings regarding the key determinants of consumers’ initial acceptance of gamification products. Following this, the second sub-section (Section 6.4.2) presents the research findings regarding the key determinants of consumers’ sustained use of gamification products.

6.4.1 Determinates of initial use

Study One identified a range of factors that positively influence consumers’ initial uptake of gamification products. Consistent with extant gamification research a major component of the initial use of gamification products was the design of the gamification product itself, or its artifactual affordance (Deterding, 2015; Nacke & Deterding, 2017). This artifactual affordance aligned in many ways with SDT with needs satisfaction identified as a major factor in the initial interest and use of gamification products, in line with previous research into gamification (eg Deterding et al., 2011b; Hamari et al., 2014; Peng et al., 2012; Ryan, Rigby, & Przybylski, 2006).

Autonomy satisfaction in particular was an important factor in the initial use of gamification products, with several users reporting that they were driven to use their apps because of the additional control and customisation offered by digital products such as gamification. Study One however indicated that the appeal of autonomy boosting features such as levels of customisation was dependent upon the users feeling that they could successful interface with these features. Several users indicated that the additional complexity was a barrier to their initial use of the product owing to the intimidating hurdle of learning these game mechanics. This was supported by the findings of Study Two which highlighted high levels of correlation between these variables. This indicates an interrelation between autonomy satisfaction and competency satisfaction, as predicted by the SDT sub-theory CET and supports the findings of past gamification studies (Pe-Than et al., 2014; Peng et al., 2012) and SDT research (Guay, Boggiano, & Vallerand, 2001).

Relatedness satisfaction was somewhat associated with initial use, with factors associated with relatedness satisfaction such as the presence of friends and family using the app being identified as sources of initial motivation to try the gamification product (Deci & Vansteenkiste, 2004). However, in a departure from past gamification research this relatedness satisfaction was not identified by participants as stemming from the mechanics of the gamification product itself (Nacke & Deterding, 2017). Rather users identified contextual sources of affordance that resulted in this need satisfaction, typically the incidental pressure of reference groups to try the app. Indeed, some users found game mechanics that conceptually support relatedness satisfaction, such as competitive leaderboards (Nicholson, 2012), to actually undermine their initial interest in a game due to their lack of desire to interact and particularly to compete with other players. These mixed findings where confirmed by Study Two which highlighted the lack of statistical significance of this factor and either intrinsic motivation or behavioural intention. While this may indicate the importance of autonomy support to allow users to ‘opt out’ of experiences they are not interested in (Forde, Mekler, & Opwis, 2015), it also provides support for researchers who

have called for a greater focus on individual factors such as player type in how artifactual affordance such as leaderboards are interpreted (Jia et al., 2016).

Departing from the established role of SDT in gamification outcomes, however, was the identification of novelty as a component of initial interest in gamification products. Many users reported that their initial motivation to try a gamification product was their curiosity in a digital service so different to alternatives. Study Two did not incorporate measures of novelty due to its focus on OIT and the conceptualisation of novelty in previous SDT research as a factor that supports autonomy satisfaction (Ryan & Deci, 2000). However, the results of Study One indicate the need for further examination of this construct. These findings support the identification of novelty as an importance factor in the adaptation of digital technologies (Lai, 2017) and provides support for researchers who have called for investigation of novelty as a specific factor in SDT outcomes (González-Cutre et al., 2016).

In conclusion, SDT was identified as an appropriate theoretical lens through which to understand the determinates of the initial use of gamification. Needs satisfaction arising from artifactual affordance formed a major component for the initial motivation to try gamification products. However, individual and contextual factors were identified as having impact on this relationship, highlighting the need for future research. Consequently, these findings highlight the importance of the mixed-methods approach to data collection undertaken by this research to identify novel components and gain a deeper understanding of the research questions (Bryman, 2008).

6.4.2 Determinates of sustained use

While neither study included longitudinal measures of behaviour change, study one investigated the qualitative differences between ongoing and discontinued users of gamification and so can provide some insight into the factors that contribute to sustained gamification use. Study One identified that the central component of sustained use in gamification was the experience of intrinsic motivation, manifesting and fun, enjoyment or interest. This was supported by Study Two that demonstrated that intrinsic motivation mediated the relationship between needs satisfaction and continued use intention. This

finding aligns with previous gamification research (Pe-Than et al., 2014; Peng et al., 2012) as well as SDT research into maintenance motivations (Grant, 2008; Cerasoli, Nicklin, & Ford, 2014). However, identifying the factors that contributed to intrinsic motivation resulted in several deviations from extant literature.

While Study One highlighted the importance of artifactual affordance in the initial use of gamification products, when discussing the maintenance of gamification use participants tended to gravitate towards sources of situated affordance such as the alignment of the app to personal goals or the expectations of others. This is a departure from past gamification research which has tended to focus on the ability of the artifactual affordance provided by game mechanics to incentivise maintained use (Nacke & Deterding, 2017).

While situated affordance in Study One existed across a diverse range of topics, the use of OIT theory was able to categorise how these sources of motivation external to the gamification product were being expressed as regulations styles by respondents. These regulation styles fit into the categories of external regulation, introjected regulation and identified regulation (Deci & Ryan, 2002), however, Study One did not identify any individuals displaying integrated regulation. Importantly, these situated affordances had positive or negative impacts on the sustained use of gamification products aligning with how internalised or externalised the regulation style being experienced was. Thus, externalised regulation styles such as external and introjected regulation undermined sustained use while internalised regulation styles contributed to sustained use. These findings were largely confirmed by Study Two, with regulation style impacting on use intention through autonomy and competency needs satisfaction. However introjected regulation was not found to have a significant impact in the business context.

This research therefore suggests that a major determinate of the maintenance of gamification use, in addition to the ability of the gamification product to satisfy needs for autonomy and competency, is the regulation style through which the situated affordances of

the context being gamified are interpreted.

6.5 Implications for Theory

The previous section addresses the research questions posed by this thesis. This section presents the contributions made to self-determination theory, social marketing and commercial marketing literature, as well as the use of theory in gamification research as a consequence of addressing the research questions. First, contributions to social and commercial marketing literature is outlined in Section 6.5.1. Next, the contribution of this research to the gamification literature is outlined in Section 6.5.2, followed by the contributions this research makes to extending SDT theory in Section 6.5.3.

6.5.1 Contributions to social marketing and commercial marketing theory

This research identifies psychological needs satisfaction and regulation style as key factors in understanding the use of technology-based products such as gamification in social marketing. Specifically, that controlling regulation styles such as external and introjected can undermine the capacity of products such as gamification to satisfy psychological needs. In doing so, it highlights the importance of SDT, and particularly OIT in understanding the impact of context on the maintained use of technology-based products. Through the use of mixed-methods research to clarify the determinates of gamification use, this research addresses the difficulties that past research has had in identifying the factors that underpin technology adaptation in consumers (Lai, 2017). This addresses the call in extant commercial (Gao & Bai, 2014; Oliveira, Thomas, Baptista, & Campos, 2016) and social marketing literature (Immonen & Koivuniemi, 2018; Lee & Han, 2015) for a greater use of theory in the examination of the determinates of technology adaptation. In particular, through the use of OIT to identify externalised regulation styles such as external regulation and introjected regulation as limiting factors in the use of gamification products, this research addresses specific calls for research to focus on establishing a better understanding of the barriers to technology adoption (Lee & Coughlin, 2015). This is an important contribution, as social marketers commonly operate within contexts where behaviours have limited initial intrinsic motivational appeal and are often heavily regulated by extrinsic motivational forces (French,

2017). By highlighting that regulation style influences how these extrinsic forces might be interpreted this research suggests that future social marketing research should explore the factors that help facilitate the internalisation of extrinsic motivation, a topic that has seen limited focus thus far.

This research also highlights that internalised regulation styles such as introjected regulation can support needs satisfaction and contribute to use intention. Thus, suggesting that gamification use may be dependent upon perceived utility and alignment with the users' core values. This focus on the determinates of the use of gamification products, an emerging technology-based service that fits within Kotler & Lee's (2016) three-tiered conceptualisation of product as an 'actual product', reflects the shift in discussion of product within the social marketing mix towards tangible goods and services that support behavioural change (Rothschild, 2009; Smith, 2009; Kotler & Lee, 2016). The divide in how researchers discuss the product mix within social marketing research and the difficulties this has caused has been identified as a growing limitation to the capacity of extant research to establish the determinates of social marketing products capacity to support behavioural maintenance (see Edgar, Huhman, & Miller, 2017, Thackeray, Fulkerson, & Neiger, 2012).

This paper addresses this limitation by providing empirical support for the focus on tangible goods and services in social marketing research and highlights the utility of drawing on theory beyond the panoply of commercial marketing theories to understand how these products can support behavioural change through the satisfaction of psychological needs. This addresses the growing call in the social marketing literature to broaden the use theory use within this context in response to the growing range of behaviour change tools social marketers have at their disposal (see Lefebvre, 2011, Kubacki et al., 2015).

Through highlighting that the intrinsic motivational pull of gamification is dependent upon the users' regulatory style, this research suggests that maintained behaviour change through social marketing products will depend both on the extrinsic motivational context being

targeted, as well as how that context is interpreted by the end user. This contribution helps to address the limited focus in extant literature on theory driven exploration of the antecedences of behavioural maintenance (Rundle-Thiele et al., 2019). The use of gamification, a technology service that changes how users engage with a target behaviour, to support maintained behaviour change also addresses the calls for theory driven investigation into social marketing's capacity to achieve behavioural maintenance through non-marketing approaches such as direct modification of the behaviour (Spotswood, French, Tapp, & Stead, 2012).

6.5.2 Contributions to gamification theory

This research confirms the utility of SDT as a guiding theoretical lens in gamification research, but also highlights that its use must be broadened to incorporate a wider variety of concepts than the narrow focus on intrinsic motivation evident in existing literature (Nacke & Deterding, 2017). Specifically, the identification of regulation style as a determining contextual factor in the experience of gamification outcomes, addresses the calls for theory driven investigation of sources of situated affordance in gamification research (Deterding, 2015). Through the incorporation of OIT, the use of SDT in gamification research is broadened and thus this research helps to address the call for gamification research to incorporate both measures of contextual and individual factors to better identify possible determinates of gamification outcomes (Deterding, 2015; Nacke & Deterding, 2017; Mekler et al., 2017; Mitchell et al., 2017). These findings indicate that intrinsic motivation is dependent upon more than just the specific game mechanics of the product, but also upon the context being gamified. Specifically, when users feel controlled by their context such as through rewards/punishments (external regulation) or social pressure and guilt (introjected regulation), the ability of the app to support needs satisfaction is reduced. While extrinsic motivation is commonly discussed in gamification research (Deterding, 2015), this research represents the first empirical examination of extrinsic motivation and highlights the need for further study in this direction. This is in contrast with extant gamification literature, which has largely called for a greater focus on specific game mechanics (Hamari et al., 2014).

While largely supportive of the use of SDT in gamification studies, this research also

highlighted the limitations of using SDT in this context, with relatedness satisfaction being found to have limited influence over behavioural outcomes and differences between the impact of introjected regulation between health and workplace contexts. Given that SDT has emerged as the most-frequently used psychological theory in gamification research (Seaborn & Fels, 2015), identifying the limitations and potential complications of using this theory in gamification research has become a focus of gamification literature (Nacke & Deterding, 2017). This research therefore contributes to the critical assessment of this theory in gamification research through identifying differences between how this theory operates within the contexts examined comparative to SDT research in other fields.

Additionally, the identification of the negative impact externalised regulation styles such as external regulation have on gamification outcomes highlights the potentially negative consequences of poorly implemented gamification strategies. The identification of negative outcomes in extant literature has been limited by a positive result bias and the infrequence in which potential negative outcomes are even measured (Bogost, 2013; Kim & Werbach, 2016; Lewis et al., 2016). By identifying negative gamification features this study addresses this limitation, while also raising the potential implications for the ethics of gamification use as has been called for by previous gamification literature (Bogost, 2013; Kim & Werbach, 2016).

6.5.3 Contributions to self-determination theory

This research supports the use of SDT within social marketing contexts and extends the explanatory scope of SDT within gamification literature to include contextual factors such as regulation style that have yet to be empirically explored by the extant literature (Nacke & Deterding, 2017). Through empirical examination, it demonstrates the ability of SDT, and sub-theories such as OIT and CET to explain consumers' use intentions for gamification products. However, this research also highlights scope for improving this theory's explanatory power within the gamification domain, and through doing so provides contribution to use and understanding of SDT more broadly.

This research demonstrates the positive relationships between autonomy and competency support and intrinsic motivation, consistent with previous SDT theory research in gamification (Pe-Than et al., 2014; Peng et al., 2012). However, quantitative analysis also highlighted the lack of statistical impact of relatedness satisfaction on intrinsic motivation, in contrast with the predictions of SDT (Deci & Ryan, 2004). While CET suggests that intrinsic motivation is primarily the result of autonomy and competency needs satisfaction, relatedness needs satisfaction still plays a facilitating role within this sub-theory (Deci & Ryan, 1985, Grolnick & Ryan, 1989) which would make the lack of statistical association surprising. This is an area of some contention within the SDT literature however (Ryan & Deci, 2000), and this need has typically been left out of analysis of gamification outcomes (Peng et al., 2012). As highlighted in section 6.2.3, there are several possible explanations for why relatedness satisfaction had limited significant relation to intrinsic motivation, and so this finding does not support the current trend in CET driven gamification research to ignore relatedness satisfaction. Indeed, the qualitative findings of study one provides justification for the incorporation of broader conceptualisations of relatedness satisfaction, such as meaningful relations of virtual non-player characters and interactions with others outside of the app, into future measurement instrumentation. This has particular significance to the field of CET research, in which the ability of simulated human interaction (such as that provided by a non-player character) is still an area of contention (Sailer et al., 2017).

Qualitatively, this research highlights the potential for gamification to bring about the internalisation of virtual rewards, with users reporting a conscious evaluation of these mechanics indicating a shift towards identified regulation. Given that these mechanics (such as the collection of virtual Pokémon) did not align with existing values (such as valuing physical fitness), this indicates that the gamification product itself has created an environment in which users can be encouraged to value the pursuit of these virtual rewards rather than relying on aligning these mechanics with existing motivation. The potential of gamification to facilitate this process of internalisation is significant to OIT research in particular, which is fundamentally concerned with the factors that contribute to the internalisation of extrinsic motivation (Deci & Ryan, 2002).

An established component of OIT research, is that regulatory styles are highly depended on interpersonal climate (Deci & Ryan, 1985; Ryan, 1995), with Deci and Ryan (1991) suggesting that internalisation is a process fuelled by external prompts made by significant others or salient reference groups. While Study Two lacked the longitudinal data necessary to confirm the change in regulatory style, it did highlight that gamification operated without much contribution from relatedness needs satisfaction. This, coupled with the findings of Study One, may suggest that gamification is capable of facilitating the internalisation of extrinsic motivation through gameplay rather than support from salient reference groups. This contributes to a greater understanding of how individuals move through regulation styles, addressing calls for further research into how this process can be facilitated (Ryan & Deci, 2000; Deci & Ryan, 2004).

One additional component of SDT that was challenged by the findings of this research was the role of novelty in the experience of autonomy. The findings of Study One suggested that novelty was an important component of intrinsic motivation and engagement, with frequent updates to introduce new content being considered an important component of the motivation appeal of several apps. SDT has typically considered novelty as a component of intrinsic motivation and thus a complementary component of several psychological needs (Ryan & Deci, 2000). For instance, the optimal challenge required for the experience of competency satisfaction necessitates a degree of novelty and unexpectedness. Similarly, the experience of autonomy satisfaction requires a degree of novelty to prevent the feeling of being trapped in a pattern of experiences. Relatedness too may depend on novelty to provide a continued variety of experiences to share with others. Other researchers have maintained that novelty is best conceptualised as a component of autonomy, with the drive for control reflecting a drive to experience new sensations (Roth and Hammelstein, 2012, Roth, Hammelstein, & Brähler, 2007). The specific identification of novelty as a factor for both initial and sustained use of gamification in Study One challenges this notion and contributes to increased calls to measure the impact of novelty on SDT outcomes separate to

the other SDT concepts typically assessed (González-Cutre et al., 2016).

6.6 Implications for Practice

In addition to the above theoretical implications, the findings of this research also present a range of practical implications. These findings are delineated below, first broader implications for the design and implementation of gamification products are presented. This is followed by an overview of implications of this research on the practice of social marketing. Finally, an outline of the implications of this practice in commercial marketing, including internal marketing in environments such as workplaces, is provided. The practical implications of this research are discussed in relation to the contributions of the whole thesis, with complementary findings highlighted between the two studies. In this way, this section extends the previous chapters (Chapter 4 and Chapter 5) which have outlined the individual practical contributions of each of the two studies.

6.6.1 Implications for gamification design and implementation

This research provides further support for the use of SDT to inform the practice of gamification (Deterding, 2015; Seaborn & Fels, 2015), through the demonstration of an association between intrinsic motivation and behavioural intention. This finding suggests that enjoyment and interest should be design goals when creating gamification products. Further, through the use of CET this study also highlights that autonomy and competency satisfaction are major components of gamification's ability to facilitate intrinsic motivation. Practically this finding suggests that to enhance a gamification product's behavioural impact, the product should incorporate game design mechanics that have been shown to support autonomy satisfaction such as avatar customization or narrative agency through meaningful in game choices (Peng et al., 2012) and competence needs satisfaction such as virtual rewards and performance information (Sailer et al., 2017). However, this research also highlights the limited importance of relatedness satisfaction in the experience of intrinsic motivation, suggesting that autonomy and competency supportive features should be prioritised over features such as competitive leaderboards and social media integration which are more focused on relatedness satisfaction (Peng et al., 2012). This is an important

practical contribution, as previous research into SDT has either not included measures of needs satisfaction or been able to link needs satisfaction to behavioural intention or intrinsic motivation (Xi & Hamari, 2019). This research therefore provides the first gamification context specific examination of the psychological determinates of intrinsic motivation.

This research also highlights that the ability for a gamification product to satisfy autonomy and competency needs is impacted on by the motivational context of the gamification app itself. The use of OIT highlights that needs satisfaction is negatively impacted by external regulation such as rewards and punishment and indicates that in some contexts introjected regulation from social pressure and guilt may also be a limiting factor. This suggests that external pressure to use gamification products may be a barrier to successful gamification outcomes and thus that when designing gamification products, the negative impacts of externalised motivation should be minimised. This might take the form of minimising controlling language around gamification use, ensuring that gamification use is voluntary rather than mandatory and avoiding the use of external rewards and punishments to encourage gamification use (Ryan & Deci, 2000; Deci & Ryan, 2004).

By highlighting the positive impact of identified regulation, or user identified value and goal congruence, this research indicates that not all extrinsic motivation necessarily undermines intrinsic motivation. If the gamification product is seen by users as useful in the pursuit of some external goal or expression of personal values, then gamification may become intrinsically motivating despite the goal or value being extrinsic to the behaviour being targeted. This has implications for the targeting of gamification products, suggesting that gamification will be most effective to support behavioural change when used by those who already value the benefits of that behaviour change. This also suggests the way that the benefits of gamification use are conveyed to users will have impact on behavioural outcomes. For example, gamification design should focus on communicating the ways in which the gamification product is making the target behaviour easier, more rewarding, and more engaging to help reinforce the value of the product to the user and help reinforce

identified regulation.

However, the qualitative findings of Study One also highlights the capacity for gamification to facilitate the internalisation of extrinsic motivation, using game mechanics to support the positive evaluation of progress within a gamification. While the capacity of gamification to support this requires further quantitative evaluation, this suggests that gameplay features such as narrative and virtual rewards may allow gamification to facilitate behavioural change even in users that lack an initial motivation to pursue the behaviour being gamified.

6.6.2 Implications for social marketing practice

As highlighted above, through the use of SDT, and sub-theories such as OIT and CET, this research identifies that extrinsic motivation that has been not been regulated internally (such as external regulation and introjected regulation in some contexts) limits the ability of gamification to create intrinsic motivation and stimulate behavioural intention. This finding has particular significance for the use of gamification in social marketing contexts as these contexts are typically more externally regulated due to limited initial behavioural motivation (French, 2017).

This finding may have practical significance to social marketers as it suggests that gamification is best used to support those who are already committed to behaviour change. This is in keeping with the traditional conceptualisation of the role of social marketing, with Andreasen (2004) suggesting that the strength of social marketing is in the support of behaviour change once individuals have already began to contemplate the benefits of change (relative to other approaches such as education that help individuals transition to this contemplation stage through increased awareness of the benefits of change). This implies that gamification should be used by social marketers as a tool to facilitate change after existing persuasive efforts have already moved the target audience to the contemplation stage of behaviour change. This reflects growing calls in the social marketing literature for multi-field intervention designs in which social marketing campaigns are integrated alongside other behaviour change approaches (Spotswood, French, Tapp, & Stead, 2012).

However, while the initial reluctance to engage in social marketing behaviours presents a

barrier to the use of gamification in these contexts, this research also suggests that these barriers can be overcome through the use of game mechanics that clearly communicate benefits to the user and help reinforce identified value. Further, gamification may be capable of generating this identified value even when the user is not consciously valuing the underlying behaviour targeted, rather making an evaluation of their engagement in the gamification product itself. For instance, those playing Pokémon Go may not be consciously choosing to increase their exercise behaviour, rather it is an incidental outcome of playing a game they are enjoying (Wong, 2017). This suggests that even in situations where the target audience has not already committed to behaviour change gamification may still be successful in supporting behaviour change when sufficiently advanced game mechanics are employed to create a powerfully engaging game like experience. However, given the impact of preference and contextual factors such as the fear of embarrassment some users associated with gamified apps that looked too much like 'trivial' games identified in study one, creating a gamified app capable of this fully engaging experience may require a high level of target audience insight and further research into the impacts of player type on gamification interaction.

6.6.3 Implications for commercial and internal marketing practice

These findings support the use of gamification to incentivise behaviour change in commercial contexts, particularly in the internal marketing context of workplaces. This research highlights that gamification is capable of supporting sustained behaviour change through intrinsic motivation and autonomy and competency needs satisfaction and thus that marketers seeking to design and implement gamification products should focus on prioritising needs satisfaction in their product design.

However, the negative impact of externalised regulation styles such as the motivation derived from social pressure or extrinsic rewards and punishments, presents important ethical implications for the use of gamification. While externalised regulatory styles were associated with reduced use intention in this research, the majority of users in both social

marketing and internal marketing contexts indicated that their use of the app was voluntary and thus they had the capacity to cease use of the app if they wished. This raises the potential for harm in cases where app use is not voluntary, given the association of externalised regulatory styles and reduced autonomy and competency satisfaction in this research and the importance of needs satisfaction to psychological health (Deci & Ryan, 2008a; Sheldon et al., 2001). This suggests that gamification may have negative consequences for users in instances where they feel that their app use is regulated externally, and they are unable to cease use of the app. While this has ethical issues for the use of gamification in social marketing as well, this concern is particularly pronounced in internal marketing domains such as the workplace where external pressure to comply is particularly high (Gagné et al., 2010). This finding therefore reinforces the call from research such as Kim and Werbach (2016) and Korn and Schmidt (2015) who have called for greater consideration of the potential negative consequences of gamification in contexts such as the workplace. To avoid these ethical issues, this research suggests that app use should be voluntary where possible and that steps should be taken to minimise extrinsic pressure to use the app such as avoiding the use of external rewards and punishments for app use.

6.7 Limitations

As highlighted in Section 4, each study's methodology presents specific limitations that must be acknowledged and controlled for as much as possible. In addition to the specific limitations of each specific study, the overall research program presents broader limitations that represent the contextual boundaries of this study, which are acknowledged below.

Firstly, as both the qualitative and quantitative components of this research involve the use of commercial gamification products, rather than a single specific gamification product capable of researcher manipulation (as has been used by Mekler, et al., 2015), the effect of specific gamification mechanics cannot be assessed. This decision was made in response to calls for more research to be conducted on the way that gamification is experienced typically by consumers (Deterding, 2014; Seaborn and Fels, 2015). However, without the ability to collect data on user's responses to specific features this research is unable to respond to the

calls by gamification research to better quantify the effects of specific game mechanics (Mekler, et al., 2015; Nacke & Deterding, 2017).

Secondly, while some qualitative findings may support the potential for gamification to contribute to the internalisation of regulatory style, the single time point data collection strategy of the quantitative component of this research limits the ability of this research program to confirm this finding. Without longitudinal data, the direction and thus causal nature of this potential relationship cannot be assessed (Cole & Maxwell, 2003). This is a significant limitation, given the importance both SDT and social marketing research place on better understanding the internalisation of motivation (Deci & Ryan, 1985; Hagger, et al., 2014). Further, while use intention is commonly used as a proxy for behavioural maintenance (Cronin, Brady, & Hult, 2000), longitudinal measures of gamification were not used. However, given the high rates of attrition seen in other longitudinal social marketing studies in the technology domain (Patrick, et al., 2016; Eysenbach, 2005), the initial sample size that would have required for adequate sample sizes at each stage of data collection would have been prohibitive to the design of this thesis.

This is further complicated by the inclusion of self-reporting gamification apps such as 'Super-Better' that require a user to indicate their behavioural progress, rather than games such as 'Zombies, Run!' which uses locational data to measure behaviour directly. While gamification typically involves the direct incentivisation of a behaviour through game mechanics, and thus to use the gamification app necessitates engaging in the behaviour (ie, to play Pokémon Go requires users to physically move), engaging in these self-reporting apps does not necessarily require the undertaking of the targeted behaviour. This has implications for this study's use of behavioural intention towards the app as a proxy for behavioural intention towards the targeted behaviour. While the possibility of users falsely entering information is considered a low risk, it cannot be discounted completely and so future research should also incorporate independent measures of the underlying behaviour.

Last, while the post-positivist paradigm underpinning this research design allows for better situating of these findings within the existing literature, the use of extant theory may result in some of the determinates of gamification's use and maintenance to be missed. In keeping with the post-positivist paradigm, this research focused on confirming the utility of SDT and sub-theory OIT within the behavioural domain of gamification. However, this focus on extant theory may have resulted in additional determinates not being considered and thus missed. While the use of a first round of open coding in Study One sought to compensate for this, the impact of extant theory on the interpretation of results is a necessary limitation of this research.

In addition to above outlined threats to internal validity, threats to external validity can also limit the findings, calling into doubt the generalisability of the study's results (Guba & Lincoln, 2005). While the mixed methods and field study design of this paper builds support for the applicability of findings (Cook & Campbell, 1976), the use of a non-probabilistic sampling strategy in both the quantitative and qualitative components of this research has implications for external validity (Gordon, Slade, & Schmitt, 1986; Lohr, 1999). This limitation was considered acceptable given the widespread use and acceptance of non- probabilistic online recruitment (Casler, Bickel, & Hackett, 2013) and the prevalence and necessity of convenience samples (Greenwood & Levin, 2006).

6.8 Directions for Future Research

While avenues for future research have been discussed throughout this thesis, this section will outline key research directions highlighted by the findings of this research as a whole rather than on a per study basis.

Broadly, additional research is required to validate the findings of this thesis and explore the contextual boundaries of its findings given the limitations outlined in the previous section. Repeating these findings in different behavioural contexts (beyond physical activity and the workplace), as well as in different population groups and cultural contexts, would help to validate the findings of this research as well as help identify a broader array of determinates arising from the context being gamified. Further, replicating these findings within a

longitudinal research design would better identify the relationships between the variables identified in this study (needs satisfaction and regulation style), in particular identifying the direction of these relationships which would be of great significance to SDT and social marketing research (Daley & Duda, 2006; Mullan & Markland, 1997).

While this research has identified the utility of SDT in identifying the determinates of gamification outcomes in social marketing, further research should be directed towards assessing the capacity of SDT to explain outcomes relative to other theoretical models. While SDT has emerged as the most prevalent theory in gamification research (Nacke & Deterding, 2017), other theories such as the combination of flow theory and the technology acceptance model have shown utility in video game research and may be applicable to gamification settings (Procci et al., 2012; Wang et al., 2009; Hsu & Lu, 2004). In particular, given that this thesis has identified the importance of perceived utility to gamification outcomes, an avenue for future research is to explore theory associated with the goals and values that underpin identified regulation such as goal setting theory (Lunenburg, 2011), which has shown good utility in social marketing contexts such as physical exercise (Wilson & Brookfield, 2009). Although beyond the scope of this current research, broadening the use of theory in gamification research may provide additional insight into both unidentified behavioural determinates as well as the relative capacity of SDT to explain gamification outcomes.

Additional refinements to the use of SDT in gamification research are also suggested by the findings of this thesis, including the need to clarify the role of relatedness in gamification outcomes. While this research did not show statistically significant relationships between relatedness satisfaction and intrinsic motivation, qualitative findings suggested possible explanations for this finding included issues with instrument and methodological design. Given that existent gamification literature has largely avoided measurements of the relatedness construct (Peng et al., 2012), this highlights the need to move away from purely CET driven research into autonomy and competency satisfaction and towards a more holistic assessment of needs satisfaction and its antecedents. This includes the development of

better measures of needs satisfaction in gamification research, but also the assessment of needs satisfaction in a wider variety of gamification products to address the limited research conducted on game mechanics capable of supporting relatedness satisfaction such as multiplayer support and social media functionality (Peng et al., 2012). This is particularly important given the increasing debate within gamification and video game research into the nature of relatedness satisfaction with non-player characters (Sailer et al., 2017), raising the question; can a relationship with a virtual agent such as a video game character facilitate relatedness satisfaction?

Further to this, the identification of identified regulation as a key component of gamification outcomes suggests that gamification in social marketing contexts, where the initial motivation to engage in behaviour change is often low (Bloom & Novelli, 1981; Hastings, 2007; Rothschild, 1999; Thøgersen, 2005), may work best when coupled with support programs dedicated to encourage the conscious evaluation of the behavioural change being targeted. Because of this, an important avenue for future research is to investigate the complementarity of gamification and traditional social marketing programs in a mixed service approach. Whilst this research provides support for the use of gamification in social marketing programs, a social marketing approach will often draw upon a range of intervention options across the marketing mix (French, 2017). Thus, comparison studies of gamification and social marketing approaches utilising other elements of the marketing mix would contribute significantly to social marketing literature. Given the identified importance of situated affordance to gamification outcomes in this research investigating methods through which the contextual dimension of gamification use can be manipulated may yield significant behavioural impacts.

Last, the identification that externalised regulation styles may undermine needs satisfaction raises ethical issues surrounding the use of gamification in settings where users may feel pressure to continue the use of gamification products. This would require further investigation through the collection of other psychological outcomes that could illuminate user wellbeing. Such investigation is important given the increasing scrutiny of social marketing programs and the need to demonstrate that behavioural change is being achieved

to the benefit and consent of the target audience (Spootswood, French, Tapp, & Stead, 2012). This has been identified of particular importance in areas of un-equal power dynamics such as the workplace, where misalignment of employee and employer interests may result in gamification products that are detrimental to employee wellbeing (Kim & Werbach, 2016), increasing the threat of employee and regulatory backlash (Korn & Schmidt, 2015).

6.9 Conclusion

This thesis employed SDT and its sub-theory OIT, to examine the determinates of consumers' use of gamification products. Through identification and empirical measurement of the impact of regulation style (how extrinsic motivation is interpreted) on gamification outcomes, this thesis addresses the shortcomings of previous, game mechanic focused research and responds to calls for a greater focus on motivational context and a broadening of theory use in gamification research. Specifically, this research highlights that when extrinsic motivation is internalised as identified regulation (such as conscious valuing of the benefits of use), it ceases to undermine needs satisfaction and can contribute to the experience of intrinsic motivation to the improvement of behavioural intention. Conversely, when users feel controlled and fail to internalise extrinsic motivation (such as acting only to avoid feelings of guilt, or to achieve a reward/avoid a punishment), gamification suffers from a reduced ability to satisfy psychological needs, undermining intrinsic motivation and behavioural intention.

This was accomplished through two studies, the first qualitatively exploring the determinates of gamification use from consumers' own perspectives, the second quantitatively confirming the findings of the first study through two online surveys of gamification users in physical activity and workplace contexts. The results of these studies support the use of SDT to explain consumers' engagement with and responses to gamification products, with OIT in particular showing good potential to identify the specific impact of extrinsic motivation on the ability for gamification products to satisfy user's psychological needs satisfaction. Thus,

this research helps to explain the seemingly conflicting results in past gamification research in which gamification was shown to be capable of both supporting and undermining needs satisfaction. These findings suggest that the motivational context of the research being conducted, which has thus fair remained unmeasured in gamification research, plays a role in how gamification products are able to satisfy the psychological needs of users. This represents an important first step towards the identification and measurement of 'situated affordance', or contextual features that impact on motivation, alongside the better researched 'artifactual affordance' or the mechanical properties that impact on motivation. These findings also highlight several avenues for future research into both situated affordances, and the broader practice of gamification, to better secure an understanding of how gamification works and how it can be better designed and implemented.

Appendix

Appendix 1: Interview guide

Questions are a guide only, adjust language for a natural conversation. Questions are reworded dependent on whether the participant is a current or past player of their gamified app. For example, “Have you noticed anything different about your life since you started playing [App Name]” would be reworded to “did you notice anything different about your life when you were playing [App Name]”. Additionally, question 7 is reworded to “What made you stop playing [App Name]”.

Introductory ‘warm-up’ questions:

1. What did you know about [App Name] before playing?
2. Why did you first download and play [App Name]?
3. What other games have you played before? Did this have any affect at all on why you downloaded [App Name]?
    - Probe: What are the differences? What are the similarities?
4. If you were going to describe the type of games you usually play, what words would you use?
    - Probe: Why do you think you enjoy these types of games?

Key questions

5. What keeps/kept you playing [App Name]?
    - Prompt: The experience of playing? The virtual rewards offered? Pressure from friends? What triggers you to start the app up?
6. What are your favourite mechanics/features of [App Name]? Least favourite?
    - Probe: Relative to other games? Positives? Negatives?
7. What would make you stop playing [App Name], why?
    - Prompt: Amotivation? Novelty wore off?
    - Probe: What would it take to get you to come back

8. How do you feel when you play [App Name]?
    - Probe: What is your favourite part of playing [App Name]?
    - Probe: What is your least favourite part of playing [App Name]?
9. Have you noticed anything different about your life since you started playing [App Name]?
    - Probe: Any changes in behaviour? Physical activity?
10. Have you ever used mobile apps or computer programs to change your behaviour previously? Where these successful? What about video or mobile games to change behaviour? Was this successful?
    - Probe: Differences and similarities to [App Name].

Summary question – We have talked about what it is that motivates you to continue playing [App Name] and you have mentioned _____. Is there anything else you would like to add?

Final/Closing question – We have come to the end of our interview. (Thank participants). Do you have anything you would like to add or make a comment on?

Appendix 2: Study Two Online questionnaire

The below questionnaire reflects the questions and information that would be presented to participants. Where items are presented in the either/or format, this reflects where questions differed between the health and business contexts.

Title:

Workplace Gamification Survey / Personal Health Gamification Survey

Description advertised on mTurk:

Participants were recruited via mTurk via the following task advertisement, differed by the context being recruited for. After this context specific introduction, the following section provided a link to the context specific Qualtrics survey.

Health Condition:

We are conducting an academic survey about your experience with a personal health related gamified app. In order to be eligible for this survey you must be at least 18 years of age and currently using, or have used in the last three months, a gamified health app. A gamified health app is any app that encourages a non-game health related behavior such as exercise, diet or medicine adherence through game features such as points, leaderboards or badges. The mechanics might be very simple such as scoring points for walking more or following a dietary guide. Alternatively, the app might be very complex, with a story, sound and graphic design that makes the behavior feel like a game. Some examples of health related gamification include apps such as Zombies, Run!, Pokémon Go, Habitica and the Fitbit app.

Business Condition:

We are conducting an academic survey about your experience with a work-related gamified app. In order to be eligible for this survey you must be at least 18 years of age and currently using, or have used in the last three months, a gamified app in your workplace. This could be

an app that helps you improve at your work, or one that tracks your progress in key performance indicators. A gamified app is any app that encourages a non-game behavior such as education, KPI achievement or task completion through game features such as points, leaderboards or badges. The mechanics might be very simple such as scoring points for making sales or being more productive at a task. Alternatively, the app might be very complex, with a story, sound and graphic design that makes the behavior feel like a game. Some examples of workplace gamification include apps such as DevHub, Keas, Habitica, McDonalds Till Training or Treehouse.

Survey Link Instructions:

Clicking the below link will take you to the externally hosted survey. At the end of the survey you will receive a code to paste into the box below to receive credit for taking our survey.

Make sure to leave this window open as you complete the survey. When you are finished, you will return to this page to paste the code into the box.

Thank you again for your participation!

Survey link: http://example.com/survey345.html

Provide the survey code here: e.g. 123456

Upon clicking the above survey link, participants were taken to the Qualtrics survey and presented with the Participant Information Sheet. After providing consent, they were instructed to complete the following questionnaire:

When answering the following questions, consider only the gamified app that you have most recently used. Ensure that all your responses throughout this survey relate only to this single gamified app.

When selecting a response, chose the response that best applies to your app.

Question One: What is your current app usage?

(Dropdown menu: Currently using a gamified app, have used a gamified app in the last three months but am no longer using one currently, I have not used a gamified app in the last three months).

If the participant responds “I have not used a gamified app in the last three months” they are redirected to a blank page reading:

Thank you for your time. Unfortunately, you are not eligible for this survey.

Question Two: What is the name of the app you are using?

(Alphabetic field)

Question Three: What is your age?

(Numerical field)

Question Four: With which gender do you identify?

(Dropdown menu: Male, Female, Non-Binary/Unspecified)

Question Five: What is the highest level of education you have completed?

Question Six: For how long have/had you been using the gamified app?

(Numerical Field: ____ months.)

Question Seven: How often would you use this app on average?

(Dropdown menu: Several times a year, Once a month, Several times a month, Once a week, Several times a week, Once a day, Several times a day)

Questions Eight: How long would you spend using the app in a single session on average?

(Numerical Field: ____ minutes.)

Question Nine (screening and diagnostic question): What type of app are you using? (Dropdown menu: **Heath and Fitness** [Instructional text: Apps that help you improve your physical health. Examples: Zombies Run! Pokemon Go, Fitbit], **Education and Training** [Apps to teach and improve your knowledge and skills. Examples: ClassDojo, MineCraft Edu, CourseHero], **Productivity** [Apps to improve productivity to keep you motivated. Examples: Habitica, To-Doist Karma, Epic Win] **Business** [Apps used for or within businesses. Examples: Devhub, McDonald's Till Training, Keas], **Other** [Please Specify])

Question Ten (only in business condition): In which industry are you currently using this app?

(Dropdown menu: List of US occupation categories)

Question Eleven: Is your use of the app voluntary or are you required to use the app? (Dropdown menu: Voluntary, Nonvoluntary)

Question Twelve: Thinking about the app, please rate your level of agreement on the statements below on a scale of 1-7, with 1 being disagree very strongly, 4 being neither agree nor disagree and 7 being agree very strongly.

I will continue to use this app.

I would recommend this app to a friend.

If I had a choice to do it over again, I would use the same app.

Question Thirteen: Thinking about the gamified app that you use, please rate your level of agreement on the below statements on a scale of 1-7, with 1 being disagree very strongly, 4 being neither agree nor disagree and 7 being agree very strongly.

I had a lot of choices in this app.

I felt like I was free to decide for myself how to proceed in this app.

I was able to use the app the way I wanted to use it.

I felt a great sense of accomplishment using this app.

I felt able to meet the challenge of performing well in this app.

I felt that I was effective interacting with the app.

I find the relationships I form in this app fulfilling.

I find the relationships I form in this app important.

I feel close to other app users.

Question Fourteen:

I think the app is a waste of time

I don't see the point in using the app

I don't see why I should bother using the app

I use the app because other people say I should

I use the app because my friends/family/work colleagues say I should

I use the app because others will not be pleased with me if I don't

I feel guilty when I don't do use the app

I feel ashamed when I don't use the app

I feel like a failure when I haven't used the app in a while

I value the benefits of using the app

It's important to me to use the app regularly

I think it is important to make the effort to use the app

I consider using the app to be part of my identity

I consider using the app a fundamental part of who I am

I consider using the app to be consistent with my values

I use the app because it's fun

I enjoy using the app

I get pleasure and satisfaction for using the app

Upon completing the survey, participants are directed to a blank page:

Thank you for your time, this concludes the survey.
If you have any feedback or comments please make use of the below comment field: (Alphabetic field).

Your unique survey code is (box containing algorithm generated unique number), please enter this survey code into the box provided in your MTurk window to receive credit for taking our survey.

Thank you again for your participation.

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