Experimental Exploration of Acquired Brain Injury and Stigma; implementing gamified intervention to reduce stigma towards ABI.

Aisling Graydon

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Supervisor: Dr Patricia Frazer

Course Director: Cathal O'Keeffe

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Department of Psychology

Dublin Business School

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Abstract

Acquired Brain Injury - otherwise known as ABI - affects approximately 13,000 people a year in Ireland. There is minimal literature available surrounding ABI and stigma; this research study attempts to provide empirical data within this realm. This study explores the effect of a between subject's experimental design focused on mediating stigma around ABI. An experimental intervention implemented Kahoot! Software to develop an interactive quiz, it is hypothesised that gamification would result in more positive attitudes towards persons with an acquired brain injury. A revised version of the community attitudes towards mental illness (R-CAMI) scale was implemented to measure; benevolence, authoritarianism, community mental health ideology and social restrictiveness subscales. Participants (N=68) were randomly allocated to an experimental condition or a knowledge condition. The findings showed non-significance between knowledge and experimental groups on all four subscales ($p = < .005$). A multiple regression demonstrated that authoritarianism (β .782) and benevolence (β .711) were significant predictors of overall CAMI-R scale scores. Correlations demonstrated that overall scores were not significantly correlated with the level of fun or quiz scores. The analysis indicated that gamification did not result in more positive attitudes; participants scored positively on all four subscales. The findings suggest that psychoeducation is beneficial in promoting positive attitudinal outcomes using both knowledge condition and gamification condition. It is recommended that further research measures baseline attitudes pre-intervention in order to ascertain further information around stigma and acquired brain injury.

Keywords: Acquired Brain Injury, Gamification, Stigma, Experimental Design

Chapter 1: INTRODUCTION

Acquired brain injury, (otherwise known as an ABI), is a condition with approximately 13,000 diagnoses a year in Ireland alone (Acquired Brain Injury Ireland, 2017). Many cases go undiagnosed for years and in some cases a lifetime. An ABI occurs after birth, not related to a neurodegenerative condition; they can be both traumatic – external force enters through the skull- or non-traumatic. A non-traumatic ABI is as a result of; a road traffic accident, concussion, stroke, infectious disease and hypoxic/anoxic injuries. This chronic life-changing disorder manifests in many ways, with many lifelong implications (Andelic, Bautz-Holter, Ronning, Olafsen, Sigurdardottir, Schanke & Rose, 2012). The neurological implications of ABI have been explored with a plethora of empirical research; (Finnerty, Glynn, Dineen, Colfer, & MacFarlane, 2009; Christov-Moore and Simpson, 2014; Dang, Chen and Chen, 2017) however, much less is known about the stigma, and the difficulty it poses for persons living with an acquired brain injury. Processes around this area are multifaceted due to the complex nature of human behaviour such as; the explicit and implicit structures of stigma (Stull, McConnell, McGrew & Salyers, 2017) along with the influence of misattribution theory (McClure, 2011). This presents many challenges for researchers when approaching interventions to mediate stigmatised attitudes and behaviours.

Stigma based findings have proved impactful for clinical implications, understanding stigmatised behaviour and the lived experience of the targeted group (Michaels, Corrigan, Buccholz and Brown, 2013; Ngoc, Weiss & Trung, 2016; Kohls, Coppens, Hug, Wittevrongel, Van Audenhove, Koburger, Koburger, Hegerl, 2017). As community reintegration is a substantial aspect of rehabilitation post-injury, it is vital to understand better the prevalence of stigma and measures to mediate the effects, in order to provide a comprehensive chance for favourable rehabilitation. This research attempts to bring ABI into focus by first identifying the prevalence of stigma while concentrating on the implementation of gamification in the

mediation of stigma. The seriousness of an ABI can sometimes be visible; nonetheless, it is mostly invisible. It falls under the umbrella of 'invisible disabilities' whereby visible indicators are not available, and available markers are likely not attributed to ABI (Rutland-Brown, Langlois, Thomas, & Xi 2006). The invisibility of ABI can lead to significant outside pressure to perform as usual which in reality is not realistic for the survivor, for example, this can lead to the need for disclosure and self-advocacy in the workplace through seeking out supports. This pressure to perform in any capacity may lead to further mental health implications and a more profound sense of isolation (Ryan & Atkin, 2016). Current research primarily focuses on the individual rather addressing community and how it can better acclimatise to survivors.

Defining Acquired Brain Injury

The overall defining of ABI can vary from country to country, however, for the purpose of this research, the Irish definition recognises both traumatic and non-traumatic brain injury. Regardless of some differences in definition ABI is recognised as a significant medical issue in Ireland and surrounding countries, posing significant maladaptation's for the survivor with traumatic injuries presenting as the primary cause of death for those aged 15-44 (Finnerty, Glynn, Dineen, Colfer, & MacFarlane, 2009). The principal differentiation between traumatic and non-traumatic brain injury is skull penetration resulting in traumatic and no penetration resulting in non-traumatic, both occur after birth and are not related to neurodegenerative diseases such as; motors neurons disease (Lee and Newberg, 2005). According to Andelic et al., (2012) the aetiology of an ABI can include; encephalitis, concussion, stroke, hypoxic and anoxic injuries, brain contusions and other injuries which fall into the traumatic and non-traumatic bracket. The damage caused by an ABI is usually widespread, leading to a range of neurological complications. Many survivors suffer from; neurocognitive, psychological and physical impairments that often require consistent rehabilitation and support. Survivors also experience challenges that impede on everyday life and re-entering the workforce, feelings of

aggression, poor concentration and speech impediments are among some of the obstacles facing individuals (Finnerty, Glynn, Dineen, Colfer, & MacFarlane, 2009). Road traffic accidents are the most frequent causes of traumatic ABI, this is followed by, falls, accidents and sports injury, non-traumatic injuries are commonly as a result of; encephalitis, stroke, anoxia, aneurysm to name a few.

Severity and Diagnoses of an ABI

Severity and diagnoses are paramount for proper management of sequela that follow an ABI as this can significantly impact overall favourable outcomes. As neuroimaging can many times fail to retrieve the lesions and neurocognitive damage which occurs within the deeper areas of the brain other non-invasive measures are implemented to determine severity (Lee and Newberg, 2005). The Glasgow Coma Scale (GCS) is one of the main measures used to classify the severity of a brain injury, with levels of consciousness scored from 3 (worst) to 15 (no impairment). The GCS measures; verbal response, motor response, eye opening, a scoring of eight or under is documented as severe, with nine - twelve moderate and thirteen - fifteen mild. As previously mentioned within the definition section, the deficits that follow an ABI span many functions within the brain. Post-acute rehabilitation is vital in providing positive outcomes for patients. According to an experiment carried out in a Norwegian trauma centre patients who started rehabilitation 12 months post-injury had more favourable outcomes than those in the control group. Be that as it may, an actual window for favourable rehabilitation has not been decided on (Andelic et al., 2012). This early intervention is paramount to patients having the best chance at life the second time around.

It is important at this stage to recognise that there are significant barriers to rehabilitation; one such barrier is stigma surrounding ABI and how it negatively impedes favourable rehabilitation, particularly that of community reintegration.

Defining and describing Stigma

The pedagogy of stigma began with Emile Durkheim as he explored deviancy within society during the late 1890s, describing a social relationship involving the 'stigmatiser' and the one who is stigmatised (Falk, 2010). It is thought that deviation from the norms of society may lead an individual to experience or anticipate stigmatised behaviour. Within the healthcare sphere, individuals, showing or identifying with a feature, behaviour or a specific condition become subject to hostile judgement with their communities. The formulation of the definition is paramount to tackling stigma, as highlighted by Link and Phelan (2001), proposing that; stereotyping, labelling, separation from society, a loss of status, discrimination systems and the influence of power, work together simultaneously to create stigma. Solely focusing on systems that negate the effects of labelling, for instance, is an ineffective approach, adding to the challenge of mediating stigma. Link and Phelan (2001) suggest that each component strengthens the other, adding to the persistent nature of stigma which impedes on many people's lives, causing difficulties in areas such as; housing, criminality, loss of status, access to life opportunity and other valuable domains. Confronting just one element is not a valid strategy in tackling the impact of stigmatised behaviour within society. The mechanisms are interchangeable, and sophisticated methods can be implemented in order to attribute stigma to a specific group; when one mechanism does not achieve the desired result, another mechanism is used. This power sheds light on the sophisticated measures sometimes at play within stigmatisation, further highlighting the difficulties within the mediation (Link and Phelan, 2001).

The stigma described by Link and Phelan (2001) is explicit in nature; nonetheless, implicit stigma also poses significant issues to society. Explicit and implicit stigma run on two different psychological systems, which Link and Phelan (2001) suggest is significant in mediating the effects. Explicit stigma tends to be relatively influenced by context, with more overt techniques

such as; hate speech and implementing structures discriminating towards the group, thus easier to measure. However, implicit stigma works on a covert level with complex social behaviours perpetuating the biases within society. Implicit stigma proves challenging to combat; due to the subconscious nature, this may happen despite what an individual may say they believe about a particular cohort, therefore requiring a significant amount of intervention over time (Devine, Forscher, Austin & Cox, 2013).

Stigma and how it affects those living with an acquired brain injury

Persons who have suffered an ABI often face a deterioration of their social network; impairments suffered post-injury heavily influences this (Teasell, Bayona, Marshall, Cullen, Chundamalla, 2007). Nevertheless, social withdrawal due to anxiety as a direct result of stigmatised responses impedes significantly on community reintegration. The pressure to perform as pre-injury causes survivors to self-conceal, leading to a greater sense of loneliness and lower self-esteem. However, it is important that patients have an appropriate rehabilitation plan in relation to divulging information about the injury (Hagger & Riley, 2015). Both disclosure and non-disclosure are two-fold and the decision to do so largely depends upon the weighing up of factors for the individual, nevertheless, this level of decision making may not be viable for the individual. As stigmatisation is pre-empted from each angle, the pressure to self-conceal due to stigmatised feedback can lead to enhanced levels of anxiety (Hagger & Riley 2017). Disclosing a personal injury may result in further stigmatisation, where and when concealment has been successful (Jones et al., 2012; Hagger and Riley, 2017; Hagger and Riley, 2015).

Stigma interventions

Previous stigma intervention features a strong level of psychoeducation within; family, societal setting and mental health facilities. Michaels et al. (2013) conducted research with an anti-stigma intervention developed by 'On Our Own of Maryland Inc' and the 'Maryland

Mental Hygiene Administration'. The sample was made up of 127 participants with a mental illness and 131 mental health providers, the intervention consisted of pre and post questionnaires. Mental health providers and those with a mental illness took the attribution questionnaire pre intervention. Mental health providers also took the self-determination scale pre and post intervention. An attribution questionnaire pre intervention was undertaken by both the mental health providers and those with a mental health illness, with the mentally ill taking the Recovery Assessment Scale also. The intervention consisted of a 3-hour workshop, despite the heavy amount of assessment the research provided positive outcomes, whereby post intervention those with a mental illness reported a higher awareness of stigma, lower levels of prejudice and a greater belief in recovery. The mental health providers reported more awareness of the stigma faced by the mentally ill with increased concurrence in self-determination with the mentally ill. Lower levels of prejudice were also noted by mental health providers post intervention. The level of assessment and subsequent 3- hour workshop may pose limitations. What's more, the results reporting those with a mental illness had a greater awareness of stigma are somewhat vague. Lowe, Wilson, Crawley and Waldron (2018) research suggest that perceived stigma can have negative effects for the target group resulting in higher levels of internalised stigma, which poses increased risk of disengagement from services. A cross sectional study by Ansari, Mishra, Tripathi, Kar and Dala (2020) found that participants presenting with internalised stigma had significantly less adherence to the administration of medication. Ansari et al. (2020) suggest that internalised stigma may be detrimental in the managing of mental health. Interestingly. Lau, Pico, Pang, Jeyagurunathan, Satghare, Chong and Subramaniam (2017) found that many participants demonstrated high levels of stigma resistance and stigma internalisation simultaneously. Lau et al. (2017) further state that stigma resistance exists as a strength of character as a means to navigate and mediate an already difficult situation. Finally, Lau et al. (2017) postulate that stigma resistance is

paramount in combating the effects of internalised stigma. Going forward, applied interventions to promote stigma resistance should be explored in order to provide patients with skills to mediate the impact of stigma.

Psychoeducation has proven effective in developed and higher income countries (Kohls, Coppens, Hug, Wittevrongel, Van Audenhove, Koburger, Koburger, Hegerl 2017) although less research has been conducted in lower incomes countries. Ngoc, Weiss and Trung (2016) conducted research within Southeast Asia, in particular Vietnam. The researchers assessed the efficacy of the Family Schizophrenia Psychoeducation Program (FSPP), the areas examined include; quality of life, medication non - compliance, stigma towards schizophrenia and consumer satisfaction. The participant pool consisted of 59 patients with their families, they were recruited from the Da Nang Psychiatric Hospital, the participants were randomly assigned to either treatment or control conditions. The control group continued to receive antipsychotic medication while the treatment group took part in the FSPP simultaneously with medication. The intervention took place over three session; (T1), provided factual information about schizophrenia as a medical condition, (T2) gave the individual and their family realistic expectation for outcomes and (T3) consisted of a workshop providing the individual with the skills needed to lead a normal fulfilling life. The overall outcome of the treatment group showed an improved quality of life, medication compliance and there appeared to be an overall reduction in stigma. Furthermore, the patients and their families reported a greater level of consumer satisfaction from the service provider. The FSPP had relatively low financial implication, therefore, Ngoc, Weiss and Trung (2016) postulate, that this intervention is feasible in supporting the mentally ill and their families in lower income countries within wider Asia. It important to acknowledge that this research was carried out with individuals who had recent diagnoses; thus, little evidence is provided to suggest whether this intervention may prove beneficial to those with a longer diagnosis. Additionally, a meta-analysis by Heim,

Kohrt, Koschorke and Milenova (2020) concluded that providing mental health and stigma interventions to lower- and middle-income countries has many challenges. The recognition of culture, religion and tradition requires specific training and intervention with more strenuous randomised controlled trials to measure discriminatory implications within cultures. Heim et al. (2020) recommend researchers more fully report on cultural difficulties and implications.

Within Europe, Kohls et al. (2017) conducted an 18-month cross-sectional study using randomised digit dialling to recruit participants who had previously taken part in a phone interview and invited to take part in the study. The four countries where recruitment took place were; Ireland, Germany, Hungary and Portugal. The objective of the research was to support those with a mental illness to seek out and obtain suitable professional treatment. The intervention implemented was the OSPI – Europe multi-level suicide prevention programme which included a public psychoeducation campaign. In relation to stigma intervention and the public campaign, Germany and Portugal reported higher levels of visibility, however, there were differences in perceived stigma with the experimental regions of all countries involved. Experimental regions reported significantly less personal depression stigma than those of the control regions. Additionally, the results showed that those within the experimental regions had greater openness to those seeking professional treatment. The outcomes show some positive areas for stigma reduction through campaigning, with strong methodological measures as were also reported in Ngoc, Weiss and Trung et al. (2016) and Michaels et al. (2013), however it is important to acknowledge the highlighted limitations of these studies. It is important to acknowledge the role of self-based reporting during Kohls et al. (2017) interventions the researchers state that caution should be taken in interpreting as no causal inference should be decide on. Even so, the longitudinal and randomised control trial design of the research shows strong efficacy and promising results for those combatting stigma.

Stigma research and acquired brain injury

Furthermore, a qualitative study carried out by Riley and Hagger (2014) found that many individuals chose not to disclose their injury to others due to concern about stigmatised negative responses, leading to feelings of shame, distress and anxiety. Concerns about not fitting into social circumstances and the stress that comes with explaining what an ABI is each time also posed as a barrier to disclosure. Additionally, stigmatised reactions from others on disclosure was common, leaving many individuals feeling isolated and misunderstood. Quinn and Earnshaw (2013) examined concealed stigmatised identities (CSI) through its components which included valenced content; internalised stigma, experienced discrimination, anticipated stigma, disclosure reaction, along with counter stereotypic information. The research also investigated the "magnitude" which includes the centrality and salience of the valenced content. Quinn and Earnshaw found that negatively valenced content is influential in creating psychological distress. They state that even though individuals have the right to conceal their identity, it is essential that this concealment is a consequence of conscious choice and not as a direct consequence of the fear of stigmatised reaction or negative interactions. Quinn and Earnshaw (2013) state that, concealment due to stigma appears to negatively impact the psychological wellbeing of those with invisible identities. Research surrounding valence and magnitude is under researched, it would appear examination is needed to understand the components individually and the mechanisms at play. According to Ritsher and Phelan (2004) the impact of internalised stigma relates to increased levels of depression for those living with mental illness. Reeve (2012) describes this internalisation as a relationship that an individual has with themselves, they refer to this condition as internalised oppression, which gives a deeper understanding of what the individual maybe facing. This has a direct impact upon the psycho-emotional wellbeing and how the person views themselves, additionally, this process

leads the individual to effectively "invalidate themselves" through the reinforced negative attitudes.

A qualitative study by Lowe, Wilson, Crawley and Waldron (2018) examined experience of living with ABI. The study titled "Lonely in my head" found an association between survivors' feelings of isolation and the perceived lack of knowledge about ABI within the community. A sense of isolation appeared to be reinforced by the survivors perceived prevalence of stigma toward ABI. Additionally, Lowe et al. 2018 found that many survivors had internalised much of this stigma as many reported negative feelings towards themselves. This insight into the minds of the survivors supports the theoretical assumptions of Reeve (2012), whereby, the negative feedback from members of the community has had a direct impact on the psycho-emotional wellbeing of the survivors. Moreover, Reeve (2012) and Vehmas and Watson (2016) described this process as psycho-emotional disablism, a form of oppression that is internalised by the vulnerable group. The Lowe et al. (2018) study revealed that stigma has a direct result on rehabilitation efforts, which poses a significant issue for recovery and community reintegration.

Clement, Schauman, Graham & Maggioni (2014) examined that, individuals with mental health issues often disengage with the available professional help. A meta-analysis including 144 studies with 90,189 participants with mental health issues found that a proportionate number of patients evaded professional help due to internalised stigma and the perceived stigma associated with mental health treatment. The meta-analysis revealed that the most prevalent stigmatised barrier was that of disclosure, the study also found that; men, youth, ethnic minorities, military personnel and healthcare professionals were among those significantly discouraged due to stigma (Clement et al., 2014). The impact stigma has on help seeking echoes the quantitative findings of Lowe et al. (2018), whereby persons living with an ABI disengaged from rehabilitation due to perceived stigma. The findings of the meta-analysis

have further significance to those living with an acquired brain injury, mental health conditions post injury is widespread among this cohort, it is not unusual for co-morbid psychiatric conditions to exist. These can result from neuromechanical changes and the difficulties that arise post injury for the survivor, the injury is often life altering with catastrophic implication for their entire life (Queensland Health, 2017). Due to the complex nature of ABI and co-morbid mental health issues, it is imperative that this cohort receive intervention in both spheres. The previous literature has highlighted the difficulties that arise in the face of stigma both internalised and societal. Lowe, Wilson, Crawley & Waldron (2018) unearthed the impact of stigma on persons with an acquired brain injury. They found that stigma does not only result in negative feelings, it may also cause disengagement with rehabilitation services and individual rehabilitation plans (IRP). This finding is problematic, as engagement in rehabilitation has a direct impact on the overall quality of life post injury (Andelic, et al., 2012). It is clear from the research available that further investigation is needed in regards to persons with an ABI and stigma, it appears little data is available on the prevalence of stigma towards this group.

The role of misattribution and acquired brain injury

Attribution theories have drawn upon clinical use for many years, however, much less is known about how this applies to persons with acquired brain injury. Misattribution is according to McClure (2011) seen principally as a result of the public misconceptions about brain injury leading to behaviours becoming attributed to more socially recognised conditions. McClure (2011) further highlights the difficulty with the absence of visible markers with research suggesting that people tend to attribute behaviour to visible deficits rather than observable deficits. Additionally, McClure (2011) found that people have a tendency to compare survivors' behaviour to that of their peers rather than premorbid behaviour, this gauge of normality is ultimately not only unrealistic but also harmful to the individual and their

recovery. Additionally, McClure (2011) proposes that; stigmatised systems for visible and invisible disabilities are polar opposites. Stigma surrounding visible disabilities often lead to exaggeration of the persons' difficulties, however due to the misattribution that happens due to invisible markers this often leads to a failure to recognise and accept the injured persons' needs and challenges. In order to support persons with an ABI it is imperative that the correct attribution is identified through consistent health campaigning in this area.

The available research regarding rehabilitation is primarily focused on a body of analysis of systems already available with limited empirical studies implementing intervention at the core of the research. Community-based attitude and stigma intervention are areas that need extensive research as community integration is a principal component of favourable rehabilitation (Martelli, Zasler, Tiernan, 2012).

Defining gamification and serious games

Gamification is defined as implementing characteristics used within conventional console/video gaming to non-gaming situations. In Bedwell and Pavlas (2012) taxonomy of gamification is derived from an examination of literature review from subject matter experts (SME). Initially, the definition contained 19 attributions within 9 categories, these ranged from; action, language and rules. The wide range of attributes in each category were repurposed and implemented in order to adapt the goal of gaming. According to Bedwell and Pavlas (2012) the wide variety of categories is an attempt to avoid theoretical overlap. Landers (2015) builds upon the Bedwell and Pavlas (2012) definition. Landers (2015) proposed that gamification extracts meaningful elements from conventional gaming that directly pertains to the project at hand. The implementation of gamified interventions with the overall intention of learning outcomes are more specifically known as serious or applied games (Fleming, Bavin, Stasiak, Hermansson-Webb, Merry, Cheek, Hetrick 2017). Furthermore, Landers (2015) states that gamification is affective in a serious -educational- gaming context. The desired outcomes are

a change in pre-existing attitudes and behaviours through instructional input and learning processes. Moreover, Fleming et al. (2017) suggests that internet/app-based interventions have impact due to their reach, those who may not otherwise be aware of interventions or certain disorders have access to the platform. Secondly, the employment of dynamic processes to encourage motivation and interaction and finally, interlinking mechanism such as; therapeutic strategies and gamification components. They postulate that the aforementioned processes are beneficial for researchers when exploring the benefits within this area. More people than ever are gaming, and it is suggested by McGonigal (2012) the industry is no longer dominated by teenagers and young males. The integration of; avatars, sounds and reward systems that encourage learning and participation with a lasting impact. The Bedwell and Pavlas (2012) experiment showed that elements such as; badges, leader boards and graphs affected the competence and autonomy components of self-determination theory. Furthermore, these elements of gamification directly affected the perceived task meaningfulness, with participants attributing deeper meaning to the task at hand. However, elements such as; avatars, meaningful stories and teammates showed to not affect "'perceived task meaningfulness", these elements did affect social relatedness experiences (Salier, Hense, Mayr & Mandi, 2016).

Gamification and psychological theory

Theoretically, gamification implements behavioural psychology employing highly sophisticated processes such as; behaviour management, feedback loops, analysis of behaviour and reward mechanisms. These processes are used when the intention is to explicitly change the participants behaviour, these elements are notably the foundation of behavioural psychology. Operant conditioning lends itself well to the gamification processes. This involves an antecedent and a consequence come together and produce a behaviour, whereby, learning is established through rewards and punishment with gaming more typically employing reward as

a motivation. Furthermore, gamification can provide behavioural psychology with an insight into some of the more complex aspects of human behaviour (Linehan, Kirwan & Roche, 2015).

Previous research in gamification

McGonigal (2011) an advocate for implementing gamification to real life situations, postulates that; the entrance into an alternative reality enables people to get more from their everyday life than escaping reality altogether. The integration of; avatars, sounds and reward systems encourage learning and participation with a lasting impact. Additionally, the main objective of gamification within the psychological sphere is to implement gaming techniques in a non-gaming context, to nurture motivation and performance for the purpose intended; for example, mediating stigma in relation to ABI. An experimental design implemented by Salier, Hense, Mayr and Mandi (2017) on the effects of specific game design through the lens of self-determination theory examined the most influential aspects of game design and intrinsic motivation. Salier et al., (2017) suggest that gamification in and of itself may not be effective, however, specific elements of gamification illicit different motivational outcomes. The experiment showed that elements such as; badges, leader boards and graphs affected the competence and autonomy components of self-determination theory. Furthermore, these elements of gamification directly affected the perceived task meaningfulness, with participants attributing deeper meaning to the task at hand. However, elements; avatars, meaningful stories and teammates showed to not affect "perceived task meaningfulness", these suggest that the aesthetic aspects of gamification may be a strong influence. Salier et al., (2017) initially suspected that the meaningful stories would afford greater task meaningfulness, as the story unfolded through "pop up" boxes with some text providing context. This element did affect social relatedness experiences and task meaningfulness, however, the information provided within the "stories" may not be salient enough to warrant a deeper response, it has been

suggested a stronger "dose" could be administered to provoke the envisioned effect (Salier, Hense, Mayr & Mandi, 2016).

A gamification method implemented to mediate stigma is; Stigma-Stop. This tool was originally created as part of a global initiative by the World Psychiatry Association to combat stigma and discrimination towards mental illness (Schulze, Richter-Werling & Angermeyer, 2003). The study included 552 students between the ages of 14 and 18, playing a sophisticated game design, which was developed using Unity3D software, this was accessible on; PC, website and smartphone. The game play presents four characters with; schizophrenia, depression, bipolar disorder and panic disorder with agoraphobia, specifically. The main objective of Stigma-Stop is to make the experience as realistic as possible; whereby the player creates an avatar and engages with the mental health sufferers on the software. The increased involvement during the games enables the player to become more acquainted with the characters (Cangas & Navarro, 2017).

The findings from Cangas and Navarro (2017) showed promising results, on a qualitative level, students commented that the Stigma-Stop game helped them to more fully understand mental health and the everyday challenges that sufferers face. Additionally, the participants made statements relating to how they feel they should treat those with mental health issues, these were largely that they should converse with them as they would with others. Overall, the study implemented a playful method and accomplished a comprehensive way to dissipate fallacies and falsehoods that are casually attributed to many of the serious mental health issues that many individuals face.

Rationale

The prevalence of ABI in Ireland alone warrants continued research in this area. The individuals that suffer an ABI in any form are left with life altering complications that may alter the trajectory of their life. It is evident that stigma has an adverse effect on favourable

rehabilitation outcomes for people living with an ABI. The narrative from the individuals found in the literature provides a deeper insight into the challenges faced, therefore, encouraging further research around this topic. At present, there is some research on acquired brain injury and stigma, however, it remains a young, under-developed area. Similarly, the empirical studies focusing on intervention to mediate stigma and acquired brain injury is minimal, nevertheless, the research available is beneficial and enables further comprehensive investigation. The empirical data pertaining to areas such as; schizophrenia, depression, suicide ideation and others proves promising, highlighting that attitudinal change is achievable within some limitations. The interventions discussed show the benefit of psychoeducation in a traditional format, using, campaign, seminars and workshops. Additionally, gamified interventions show promising results, from the Stigma Stop intervention, additional theoretically, many aspects of gamification fit into the realm of psychological theory and has the potential to add valuable research to the area of applied psychology. The available studies on gamification provide a comprehensive methodology and procedure enabling further research within this area. It is suggested that studies focusing on intervention need more development within this area as much of the literature available is theoretical and meta-analytic. This type of data is greatly beneficial to the area, nevertheless, applied psychology has been found to be active in problem solving. In this vein, the gamification literature available is promising, however, recommendations from previous researchers on implementing certain elements is paramount to its success and building upon what is already available. The challenges faced already hold a magnitude that requires lifelong rehabilitation, therefore, it is paramount that stigma, whether perceived or explicit is combated in order to nurture person-centred rehabilitation within communities.

Hypotheses

H1: There will be a significant difference in benevolence subscale between gamified and non-gamified conditions.

H2: There will be a significant difference in authoritarianism subscale between gamified and non-gamified conditions.

H3: There will be a significant difference in social responsibility subscale between gamified and non-gamified conditions.

H4: There will be a significant difference in community mental health ideology subscale between gamified and non-gamified conditions.

H5: There will be a relationship between funness and overall, CAMI scale scores.

H6: There will be a relationship between quiz scores and overall, CAMI scale scores.

H7: Age, gender and authoritarianism subscale are predictors of benevolence subscale scores.

Chapter 2. Method Section

Participants

The convenience sample consisted of 68 participants selected at random, within this group gender; n= 42 (61.8%) were female and n= 26 (38.2%) male, the only inclusion criteria required participants to be over 18 years of age, the research implemented no exclusion criteria. Participants were recruited through a google form where a randomised splitter URL was attached, randomly allocating the participant to either the knowledge or experimental condition. The majority of participants report "Irish" nationality; n= 56 (82.4%), American n= 6 (8.8%), British n= 1 (1.5%), Asian n= 1 (1.5%), Polish n= 1 (1.5%), other n= 1 (1.5%). The majority of employment within this group was split between healthcare n = 26 (38.2%) and engineering n= 24 (35.3%), the rest comprised of; education n=6 (8.8%), student n= 7 (10.3%) and other n=5 (7.4%). In relation to age, there is a broad range of ages within this group of participants; 18-24yrs n=9 (13.2%), 25-30yrs n=18 (26.5%), 31-40yrs (23.5%), 41-50yrs n=15 (22.1%), 51+, n= 10 (14.7%). The most frequently reported level of education was a Bachelor's degree n= 39 (57.4%), the remainder comprised of; Master's degree n= 18 (26.5%), Irish leaving cert or equivalent n= 5 (7.4%), QQI or equivalent n= 4 (5.9%) and Doctorate n= 2 (2.9%).

Design

The study is a between-subjects experimental randomised control trial and correlational design examining community attitudes towards persons with an ABI (Charness, Gneezy and Kuhn, 2012). The conditions consisted of a knowledge condition with a true or false style quiz and the experimental condition implementing a serious gamified quiz with a 'funnes' Likert scale question measuring user experience. The independent t-test and correlational variables are; independent variables (IV); experimental condition -gamified and non-gamified-, level of funness and true/false quiz scores. The dependent variables (DV); subscales benevolence,

authoritarianism, social restrictiveness, community mental health ideology and overall scale scores. The multiple regression variables are; predictor variables, age, gender and authoritarianism subscale and criterion variable benevolence subscale.

Procedure

Approval from the ethics board was sought from the university ethics board (see ethics section for full details). Once approval was obtained the researcher began creating the gamified quiz for the experimental condition through Kahoot! Software. This included adding statements such as "on average in Ireland 13,000 people acquire a brain injury per year", "Even after several weeks in a coma, when people wake up, most recognize and speak to others right away", "After a head injury, people can forget who they are and not recognize others but be perfect in every other way" along with fourteen more questions pertaining to acquired brain injury, (see *appendix* A for full list of questions). A 'fact sheet' was designed using the Lucidpress software, the information on the fact sheet gave direct answers to the questions asked within the true or false quiz, see appendix B for complete fact sheet. The true or false quiz was developed using google forms, the questions were identical to the questions used (see *appendix* A). The community attitudes towards the mentally ill (CAMI) was then revised to measure community attitudes towards those with an ABI. A 1- 10 Likert scale labelled to measure the "fun" had by the participants post gamified condition. Informed consent and debriefing forms were added before commencement of the study. In order to recruit participants randomly and remotely the researcher implemented a splitter URL from splitter.appdrag. This programme created two separate URLs which were amalgamated into one to ensure the participants did not know which condition they were allocated. This enabled randomisation for the knowledge and experimental condition. This procedure ensured anonymity and randomised control as the participant was only privy to the condition allocated to them via the URL. While the research project was live, the link was shared; through email, twitter, Linkedin and

Facebook, the link to the study was shared and circulated by the researcher and associates. To close the study a post was circulated through the social media outlets and the "receive response" option on google forms were disabled. The data was downloaded from google forms onto an excel sheet and coded before into SPSS for hypothesis testing and analysis.

The Intervention

The experiment required the participants to click on the link provided, this led them to either the 'gamified' or 'non-gamified' condition. Within the 'gamified' condition participants selected their demographics on the google form. To partake in the quiz the participants were provided with clear instructions that instructed them to click on the URL provided, this then brought them straight to the Kahoot! platform where a pseudonym was generated for them. The quiz required the participants to interact with the platform; select an answer (see appendix A). On completion of quiz participants were directed back to the google form, to fill out the "funness" scale and the R - CAMI scale. For the "non-gamified" condition participants selected their demographics, full instructions were then provided to access the ABI fact sheet, on completion of this participants were directed back to the google form to complete the true/false quiz and the CAMI scale (see ethics section for full description of ethics procedure).

Materials and Apparatus

CAMI Scale

The "community attitudes towards mental illness" (CAMI) consistst of 40 statements comprising of four subscales of 10 questions; authoritarianism, benevolence, community health ideology and social restrictiveness (Taylor & Dear, 1981). For the purpose of this research the CAMI scale was revised and applied to persons living with an acquired brain injury. For example, questions b. "More tax money should be spent on the care and treatment of the mentally ill" was changed to; "b. More tax money should be spent on the care and treatment of people with an ABI", j. "The mentally ill have for too long been the subject of ridicule" to "j.

Those with an ABI have for too long been the subject of ridicule", (see *appendix* C for complete

list of revised questions). The CAMI questions require the participants to answer on a 5-point

Likert scale of "Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree", score is 5-SA,

4-A, 3-N, 2-D, 1-SD with negatively worded questions reverse coded, (see *appendix* D for full

instructions). According to Taylor and Dear (1981) authoritarianism is divisive, refereeing to

the belief that those with a mental illness are abnormal and inferior to the general public,

additionally authoritarian views believe in coercive handling of the mentally ill. Example of

statements within authoritarianism are; "As soon as a person shows signs of mental

disturbance, he should be hospitalized". High scores on this scale signifies forcible strong-

armed attitudes towards people availing of mental health services. Subscale benevolence

represents views that are supporting and compassionate towards person with a mental illness

with an empathic nature towards induvial they perceive as vulnerable. Example of statements

within benevolence; "More tax money should be spent on the care and treatment of people with

an ABI" A high score on the benevolence subscale indicates a positive outlook on the mentally

ill. Social restrictiveness subscale refers to the belief that persons with a mental illness should

be restricted socially as they are a menace to society and dangerous to be around. Example of

questions for social restrictiveness; 'Those with an ABI should be isolated from the rest of the

community' A high score on the social restrictiveness scale indicates a strong sense of fear

towards the mentally ill. The last subscale on the CAMI is, community mental health ideology,

refers to community acceptance of mental health service along with the involving those with a

mental illness in society. A high score on this scale implies positive attitude and acceptance

towards community efforts for the mentally ill (Taylor & Dear, 1981). The possible range for

the four subscales; authoritarianism, benevolence, community mental health ideology and

social restrictiveness have a possible range of 0-50 and overall, R - CAMI scale scores has a

possible range of 0-200. The CAMI was implemented in this study as it measures community

attitudes, as this research is focused on stigma and attitudes towards persons with an acquired brain injury and focused on mediating stigma and improving the climate for community reintegration. Additionally, the internal consistency of the CAMI scale is promising and reported across multiple studies such as, Taylor and Dear (1981) reporting Cronbach's alpha moderate to high; authoritarianism (.68), benevolence (.76), community mental health ideology (.88) and social restrictiveness (.80). Additionally, Frykman and Angbrant (2018) reported high alpha scores also; Auth (.73), Benev (.85), Social Restrictiveness (.76) and CMHI (.85). Further internal reliability for this research study is reported in chapter 3.

Kahoot! Software

Kahoot is a game-based learning platform for serious educational gaming, this software is implemented within educational settings, from school to university as well as the workplace. In order to access all features Kahoot the researcher negotiated a three-month free trial usage plan. The software permits the researcher to develop a multiple-choice style questionnaire with interactive videos and multiple-choice options which can be accessed through a browser or mobile app (see *appendix* A). The participants were provided with the Kahoot link within the experimental condition google form, those that used a mobile app were send a code to start the quiz, on a browser no code was required. In order up maintain complete anonymity a pseudonym was generated for each participant (British Psychological Society, 2014 p. 8). Participants passed from question to question moving up or down the leader board. On completion Kahoot placed the participant on the leader board and showed the points rewarded. A link and date (8th July 2020) were provided for participants who were interested in viewing the winner of the quiz.

Lucidpress

Lucidpress was used to develop the ABI fact sheet (*appendix* B). Lucidpress is web-based desktop publishing software which can be used through a free or paid subscription. A

poster template was used to develop the fact sheet, the poster was published on the software application and the researcher opted to develop a unique URL. The URL was then copied into the google form knowledge condition.

Splitter URL Software

Due to the experimental conditions and remote nature of this study a URL was developed to ensure true randomisation within the limitations. Splitter.appdrag was used by adding the URL for each google form into the boxes allocated and then clicking 'start', this generated a single URL for sharing across social media and email. As the participants clicked on the link, they were transferred randomly to either the knowledge or experimental condition after which they were finally transferred to the end of the study in order to exit the browser.

Funness Scale

A funnes level was measure using a 10-point Likert scale. The scale is a revised version of Read, McFarlane and Casey (2001). (See *appendix* K).

Ethics

Full ethical approval was obtained for research category B by the Department of Psychology Human Ethics Filter Committee. Anonymity was considered in light of the remote experimental design, measures were highlighted and put in place to ensure no leak of personal information on behalf of the participants (British Psychological Society, 2014 p. 8). Informed consent was given through a full description and an option to decline the study if desired, (*appendix* E). It is possible that a participant may have an ABI and/or suspect a family member or friend has suffered due to the content of the gamification condition and the true/false quiz, therefore a full debriefing form with multiple contact and resources to all the applicable organisation. The researchers contact details and resources were attached to the last page of the

google form, (see *appendix* F). Inclusion criteria required participants to be aged over 18 years

of age.

Chapter 3. Results

Data Preparation

A reliability analysis was carried out on community attitude to mental health scales. Overall internal reliability is moderate to high.

Table 1

Internal reliability analysis

| Item	Cronbach's Alpha
Authoritarianism Scale	.57
Benevolence Scale	.50
Social Restrictiveness Scale	.61
Community Mental Health Ideology Scale	.72

 Factor analysis

Principal components analysis was used to confirm a one factor structure for authoritarianism sub scale. The KMO value of .65 indicates the data is suitable for analysis. Five factors have an eigenvalue over 1, however, factor 1 has an eigenvalue of 2.87 and explains 28.65% of the variance, whereas the following 4 factors have relatively small eigenvalues. This suggests a one factor solution as can be seen from figure 1.

Table 2

Factor analysis output for authoritarianism sub scale

| *Authoritarianism Scale*	Factor	Eigenvalue	% of Variance	% of Cumulative Variance
	1	2.87	28.65	28.65
	2	1.40	14.20	42.85
	3	1.28	12.70	55.60
	4	1.06	10.57	66.15
	5	1.00	10.30	76.50
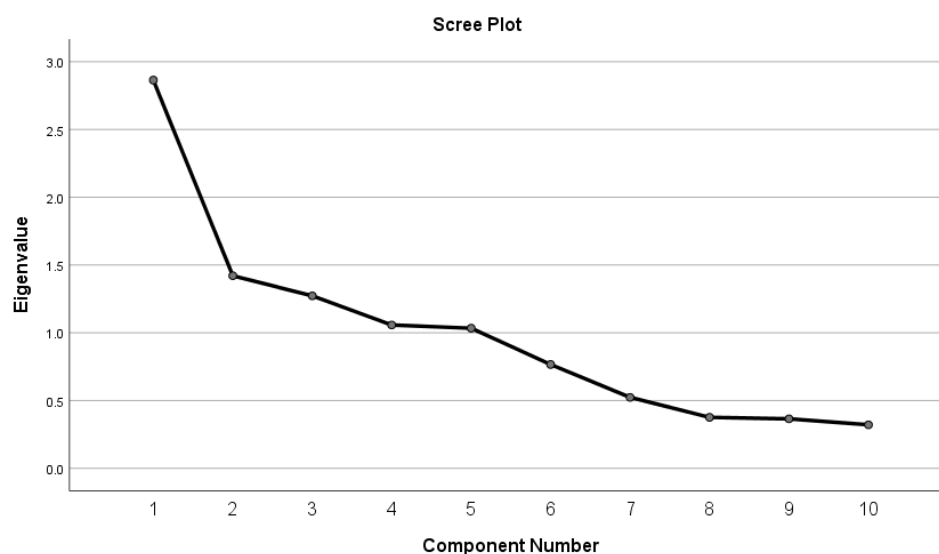
Figure 1. *Scree Plot*

Principal components analysis was used to confirm a one factor structure for benevolence sub scale. The KMO value of .61 indicates the data is suitable for analysis. Four factors have an eigenvalue over 1, however, factor 1 has an eigenvalue of 2.60 and explains 25.80% of the variance, whereas the following 4 factors have relatively small eigenvalues. This suggests a one factor solution as can be seen from figure 2.

Table 3

Factor analysis output for benevolence sub scale

Benevolence Scale:	Factor	Eigenvalue	%of Variance	% of Cumulative Variance
	1	2.56	28.65	25.80
	2	1.60	14.20	42.15
	3	1.30	12.70	54.97
	4	1.10	10.57	65.87
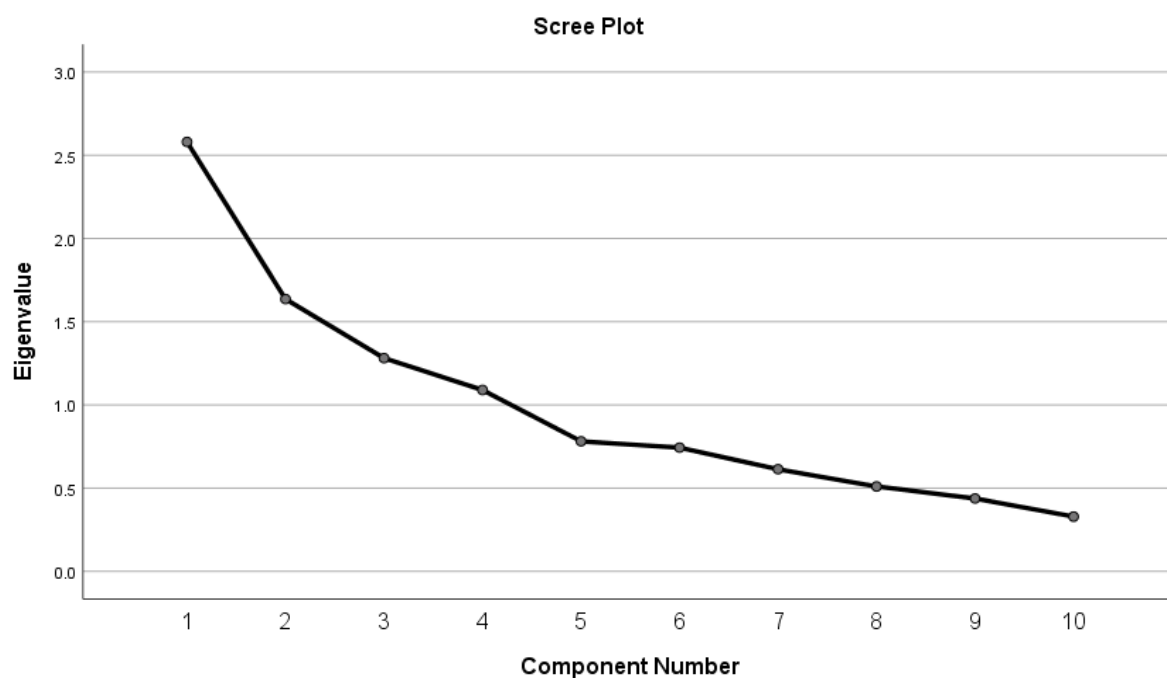
Figure 2. Scree Plot

Principal components analysis was used to confirm a one factor structure for social restrictiveness sub scale. The KMO value of .66 indicates the data is suitable for analysis. Five factors have an eigenvalue over 1, however, factor 1 has an eigenvalue of 2.90 and explains 28.90% of the variance, whereas the following 4 factors have relatively small eigenvalues. This suggests a one factor solution as can be seen from figure 3.

Table 4

Factor analysis output for social restrictiveness sub scale

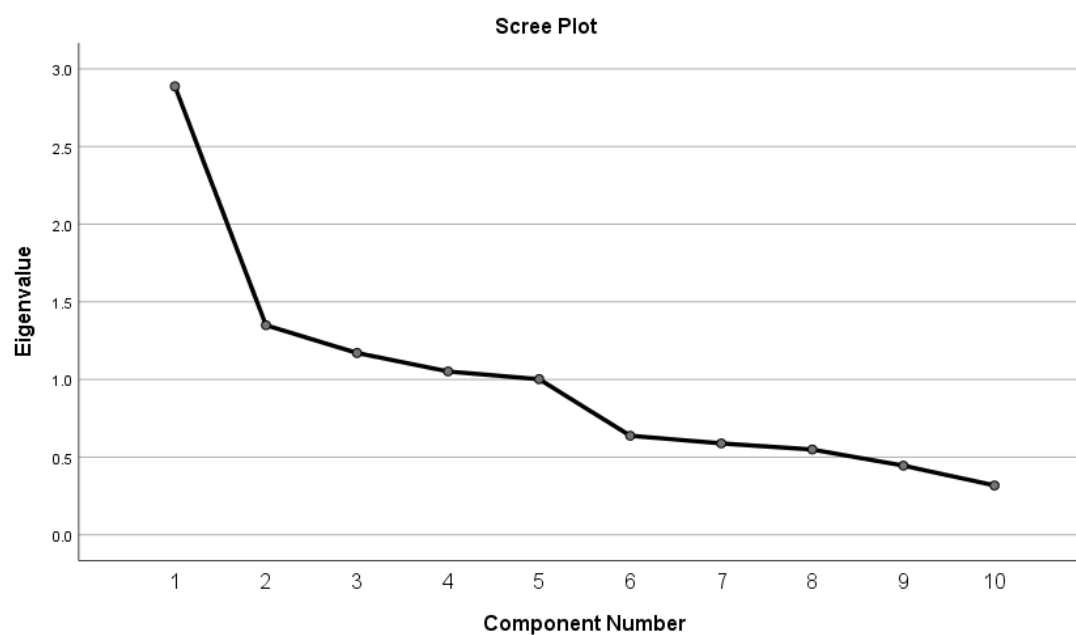| *Social Restrictiveness Scale:*	Factor	Eigenvalue	% of Variance	% of Cumulative Variance
	1	2.90	28.90	28.90
	2	1.35	13.50	42.40
	3	1.20	11.70	54.10
	4	1.05	10.57	64.60
	5	1.00	10.00	74.60

Figure 3. *Scree Plot*

Principal components analysis was used to confirm a one factor structure for social restrictiveness sub scale. The KMO value of .80 indicates the data is suitable for analysis. factors have an eigenvalue over 1, however, factor 1 has an eigenvalue of 4.15 and explains 41.40% of the variance, whereas the following 3 factors have relatively small eigenvalues. This suggests a one factor solution as can be seen from figure 4.

Table 5

Factor analysis output for community mental health ideology

Community mental health ideology subscale:	Factor	Eigenvalue	% of Variance	% of Cumulative Variance
	1	4.15	41.40	41.40
	2	1.33	13.30	54.70
	3	1.20	1010	64.80
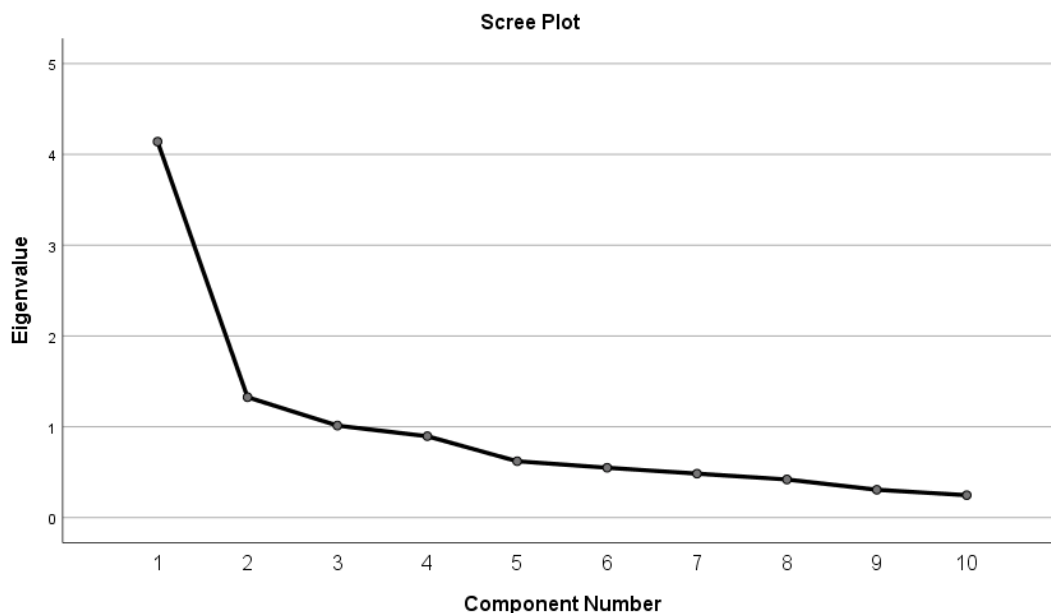
Figure 4. *Scree Plot*

Principal components analysis was used to confirm a one factor structure for all 40 items on the Community Attitudes towards the Mentally Ill (CAMI) scale. The KMO value of .65 indicates the data is suitable for analysis. This showed 13 factors with an eigenvalue over 1 explaining a total of 74.60% of the variance. However, factor 1 has an eigenvalue of 9.82 accounting for 24.60% of the variance which can be seen from figure 6.
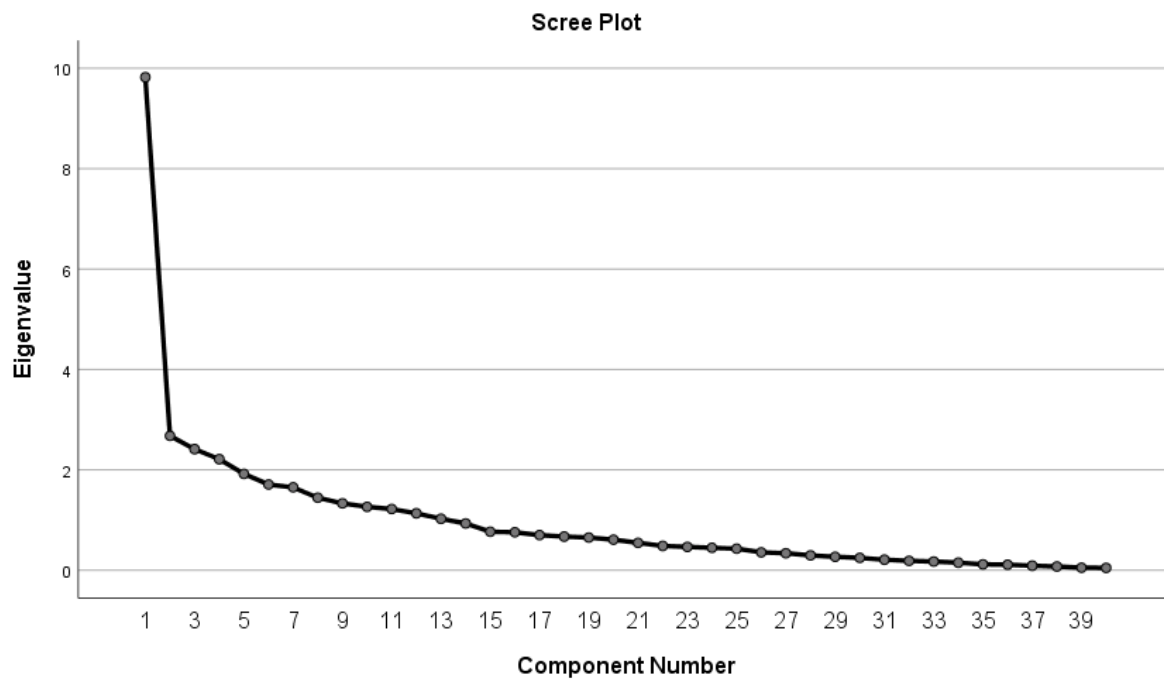
Figure 5. *Scree Plot*

Orthogonal exploratory factorial analysis

A principal component varimax (orthogonal) rotation was conducted. The analysis yielded high loadings on factors on subscale questions which pertained to more liberal attitudes towards those persons living with an ABI should be treated. This has been deduced due to questions such as; 'those with an ABI should not be denied their individual rights', 'those with an ABI should not be treated as outcasts of society', 'the best way to handle those with an ABI is to keep them behind locked doors', 'we need to adopt a far more tolerant attitude toward those with an ABI in our society'. Also, questions based on attitudes towards community integration have high loadings, this is evident in questions such as; 'it is best to avoid anyone who has an ABI', 'locating ABI facilities in a residential area downgrades the neighbourhood', 'residents should accept the location of ABI facilities in their neighbourhood to serve the needs of the local community' and ', 'the best therapy for many ABI patients is to be part of a normal community', this is further illustrated in table 5. This factorial analysis has identified four priori subscales. These four subscales are independent of one another and do not correlate.

Table 6

Community Attitudes towards the Mentally Ill orthogonal exploratory factor analysis.

Factor 1

Items	Loadings	Subscale
Those with an ABI should not be denied their individual rights	.85	Social Restrictiveness
Those with an ABI should not be treated as outcasts of society	.80	Authoritarianism
Virtually anyone can acquire a brain injury	.80	Authoritarianism
The best way to handle those with an ABI is to keep them behind locked doors	.76	Authoritarianism
It is best to avoid anyone who has an ABI	-.50	Benevolence
ABI facilities should be kept out of residential neighbourhoods.	.44	Community Mental Health Ideology
Locating ABI facilities in a residential area downgrades the neighbourhood.	.30	Community Mental Health Ideology
I would not want to live next door to someone who has an ABI	.44	Social Restrictiveness
No one has the right to exclude those with an ABI from their neighbourhood	.42	Social Restrictiveness
We need to adopt a far more tolerant attitude toward those with an ABI in our society.	-.36	Benevolence
Residents should accept the location of ABI facilities in their neighbourhood to serve the needs of the local community.	.43	Community Mental Health Ideology
The best therapy for many ABI patients is to be part of a normal community	-.30	Community Mental Health Ideology
Those with an ABI do not deserve our sympathy.	-.44	Benevolence

Notes: Loadings below .30 were suppressed.

Normality Testing

Data for all four subscales were tested for normality was using the Shapiro – Wilks test, the data meets all the assumptions for statistical analysis using parametric tests. Subscale authoritarianism, $W(68) = 0.97$, $p = .123$, benevolence, $W(68) = 0.97$, $p = .073$, social restrictiveness, $W(68) = 0.97$, $p = .113$, community mental health ideology, $W(68) = 0.97$, $p = .113$. All four subscales show no indication of being kurtotic or skewed, this is highlighted in table 7. (see *appendix F*, *appendix G*, *appendix H* and *appendix I*.)

Descriptive Statistics

A total of 68 surveys were collected, knowledge condition (N= 39, 57.4%) and experimental condition (N= 29, 42.6%). Participants varied in age from 18-24 (N=9), 25-30 (N=18), 31-40 (N=16), 41-50 (N=15) and 51+ (N= 10) and were predominantly self-identified as female (N=42, 61.8%) and males (N=26, 38.2%). The highest level of education achieved was doctorate (N=2), however, bachelor's degree was the most frequent (N=39). The most frequent identified nationality was Irish (N= 56, 82.4%), American (N= 6, 8.8%), British (N=1, 1.5%), Northern Irish (N= 2, 2.9%), Polish (N=1, 1.5%) and unidentified "other" (N=1, 1.5%). Healthcare (N=26) and engineering (N=24) were the most frequently identified employment sectors.

Table 7

Descriptive statistics tables for experimental condition, gender and scale score

Scale		Mean	SD	Skewness	Kurtosis
CMHI				.011	-.607
	Gamified	39.50	3.00		
	Non-Gamified	39.00	3.90		
	Male	38.70	4.00		
	Female	39.50	3.70		
AUTH				.249	-.603
	Gamified	19.00	3.40		
	Non-Gamified	18.00	3.50		
	Male	19.00	3.90		
	Female	18.50	3.30		
BENEV				.291	.749
	Gamified	41.10	2.70		
	Non-Gamified	42.10	3.20		
	Male	41.40	3.30		
	Female	42.00	3.00		
SOCIAL RES				.574	.291
	Gamified	18.80	3.20		
	Non-Gamified	18.20	3.70		
	Male	18.90	3.75		
	Female	18.20	3.20		
OVERALL RESULTS				.251	.749
	Gamified	119.00	4.20		
	Non-Gamified	117.00	4.43		
	Male	118.40	4.70		
	Female	118.10	3.75		

Note: Skewness standard error = .291, Kurtosis standard error = .574

Inferential Statistics

Hypothesis 1

T Test

There will be a significant difference in authoritarianism subscale between gamified and non-gamified conditions.

An independent t-test showed that there was no significant difference between authoritarianism subscale score for gamified condition (M=19.60, SD = 3.43) and non-gamified condition, (M =18.41, SD = 3.50). (t(66)= 1.44, p= .159, CI (95%) -.48 – 2.90). Levene's test shows that the assumption homogeneity of variance has been met (F(1, .007) = 1.42, p= .932). Normality assumptions were met, please see normality testing. Therefore, the null is retained.

Hypothesis 2

T Test

There will be a significant difference in benevolence subscale between gamified and non-gamified conditions.

An independent t-test showed that there was no significant difference between benevolence subscale score for gamified condition (M=41.01, SD = 2.63) and non-gamified condition, (M =42.15, SD = 3.23). (t(66)= -1.43, p= .157, CI (95%) -2.51 – .415).). Levene's test shows that the assumption homogeneity of variance has been met p= .332. Therefore, the null is retained.

Hypothesis 3

T Test

There will be a significant difference in social restrictiveness subscale between gamified and non-gamified conditions.

An independent t-test showed that there was no significant difference between benevolence subscale score for gamified condition (M=18.75, SD = 3.00) and non-gamified condition, (M =18.20, SD = 3.70). (t(66)= .693, p= .491, CI (95%) -1.08 – 2.24). Levene's test shows that the assumption homogeneity of variance has been met p= .212. Therefore, the null cannot be rejected.

Hypothesis 4

T Test

There will be a significant difference in community mental health ideology subscale between gamified and non-gamified conditions.

An independent t-test showed that there was no significant difference between benevolence subscale score for gamified condition (M=39.35, SD = 3.75) and non-gamified condition, (M =39.00, SD = 3.80). (t(66)= .371, p= .712, CI (95%) -1.50 – 2.20 Levene's test shows that the assumption homogeneity of variance has been met, p= .95. Therefore, the null is retained

Hypothesis 5

Pearson Correlation

There will be a relationship between funness and overall, CAMI scale scores.

A Pearson product moment correlation coefficient found that there was a weak negative non-significant relationship between funness (M = 7.80, SD = 2.08) and overall community attitude to mental scale score (M = 118.20, SD = 4.40), r = -.042, n= 29, p =. 83. Therefore, the null is retained. This relationship can account for 00.16% of variation of scores.

Hypothesis 6

Pearson Correlation

There will be a relationship between quiz scores and overall, CAMI scale scores.

A Pearson correlation coefficient found that there was a weak negative non-significant relationship between funness (M = 14.80, SD = 1.67) and overall community attitude to mental scale score (M = 118.20, SD = 4.30), r =. -.251, n= 39, p= .123. Therefore, the null hypothesis cannot be rejected. This relationship can account for 6.30% of variation of scores.

Hypothesis 7

Regression

Gender, benevolence subscale and authoritarianism subscale are predictors of benevolence subscale scores.

Multiple regression was used to test whether age, gender and authoritarianism subscale scores were predictors of benevolence subscale scores. The results of the regression indicated that one predictor explained 25% of the variance (R² = .54, F(3, 64) = 27.06, p < .001). It was found that authoritarianism subscale scores are a predictor of overall CAMI-R scale scores (β

= .78, p = .000, 95% CI = .726 – 1.20), and benevolence subscale scores are a predictor of

overall scores (β = .70, p = .000, 95% CI = .727 – 1.27).

Table 8

Output table for regression model and beta values

	R	Adj. *R²*	β	Sig.
Model Summary	.560	.540		.000
Benevolence			.700	.000
Gender			-.016	.845
Authoritarianism			.780	.000

Tests to see if the data met the assumption of collinearity indicated that multicollinearity

was not a concern (Age, Tolerance = 1.00, VIF = 1.00; Gender, Tolerance = .98, VIF = 1.02;

Authoritarianism, Tolerance = .98, VIF = 1.02).

Chapter 4. Discussion

This research study examined attitudes around ABI using a revised version of the community attitudes towards the mentally ill (CAMI) scale. Subscales, benevolence, authoritarianism, community mental health ideology and social restrictiveness were measured against conditions; gamified (experimental) and non-gamified (knowledge). The research covered seven hypotheses; four independent t-tests exploring whether experimental condition is a predictor of subscale scores, two correlational designs, examining the relationship between overall scores, levels of funnes and true/false quiz scores. A multiple regression investigated whether; gender, benevolence subscale and authoritarianism subscale are predictors of overall R-CAMI scores. Overall, the hypotheses were not substantiated, nevertheless, there was some promising outcomes. The independent t-tests demonstrated that experimental condition did not predict subscale scores, the Pearson correlation for both hypotheses proved non-significant. The multiple regression demonstrated that authoritarianism and benevolence subscales are strong significant predictors showing the greatest increase effect on overall CAMI-R scores, with both variables. To the researcher's knowledge this is the first experimental study to explore the effects of gamification intervention and attitudes towards persons with ABI. As identified within the introduction chapter, a moderate to wide range of research is available for; stigma interventions and gamification respectfully, however, considerably less ABI research is available for analysis. The CAMI scale has been used to explore community attitudes relating to residential group homes for the mentally ill (Taylor & Dear, 1981), the impact of gender on attitudes towards the mentally ill (Edwalds-Kvist, Hoberg and Lutzen, 2012) and the differences in attitudes the mentally ill between healthcare and non-healthcare trained worker (Cashwell & Smith, 2011). There appears to be no available research using the CAMI to assess community attitude towards persons with an ABI. The majority of research focusing on stigma

and ABI is qualitative, exploring the subjective experience of those living with an ABI (Lowe, Wilson, Crawley and Waldron, 2018). Pursuing this area quantitatively will provide some clearer constructs and insights into measures for mediating stigma and encouraging positive attitudinal outcomes. It was hypothesised that there would be a difference in CAMI subscales scores between experimental conditions; gamified and non-gamified.

This preliminary research raises more questions than it answers in many ways, for instance; the statistical analysis for experimental conditions on all four-independent t-tests were non-significant. All data preparation showed moderate to high reliability, the normality testing showed overall normal distribution across the board and all assumptions were met, suggesting that the analysis provided an accurate output using parametric tests (Laerd, 2019). The gamified condition attempted to make the applied quiz as aesthetically pleasing and interactive as possible with the software available, as suggested by Salier, Hense, Mayr & Mandi (2016), visuals, sounds, badge rewards and leader boards appeared to have the greatest effect to task meaningfulness. Nevertheless, the intervention applied to this research study is considerably simple in comparison to the 3D Unity database used within the Stigma-Stop intervention (Scvillhulze, Richter-Werling & Angermeyer, 2003), where, participants were acquainted with objective views of those with different mental health issues. It is possible that the lack of visual story telling impeded on the overall result. However, Salier et al. (2016) postulated that storytelling and emotive affects are not meaningful in creating favourable outcome. Despite this, they state that the dose of emotive affect within the study may have been weak thus, failing to evoke a significant result. Furthermore, it was hypothesised that the fun of taking part in the gamified condition would correlate with the overall score outcomes, this analysis proved to be non-significant also. The Likert scale was ten point and, the mean result for funness was 7.8, suggesting that overall, the user experience was positive despite the non-significance of the Pearson correlation output.

The knowledge condition demonstrated a psychoeducation approach in the form of a fact sheet resembling a health campaign. As previously mentioned, there were no differences in group scores, however, the mean score for the quiz results was 14.7 out of total score of 17 with all participants completing, demonstrating some positive interaction. What is more, the mean scores for each subscale within each condition are mainly positive attitudes. Taylor and Dear (1981) have stated that high scores on both the community mental health ideology and benevolence are indicative of positive attitudes towards the mentally ill or in this case a person with an ABI. High scores on the authoritarianism and social restrictiveness subscale, identify a less favourable attitude. The mean subscales scores for both conditions are parallels, mean score authoritarianism is 19.00 and 18.00, community mental health ideology 39.50 and 39.00, benevolence 41.10 and 42.10, social restrictiveness 18.80 and 18.20 and finally, overall CAMI-R scale scores are 119.00 and 117.00 respectively, it is evident that there is no significant difference in means between conditions. Likewise, the researcher can deduce that this particular sample appears to hold mainly positive attitudes towards persons with an ABI.

The mean scores between genders are not significantly different, for instance, female mean scores on the benevolence subscale was 42.00 while male mean scores are 41.40, again it can be seen that there is no significant difference in scores. These findings contradict the results reported by Edwalds-Kvist, Hoberg and Lutzen (2012) and Taylor and Dear (1981), whereby females were found to show more empathic attitudes towards the mentally ill. Christov-Moore and Simpson (2014) carried out a neurological metanalysis investigating empathy and brain behaviour, the analysis revealed that females are more likely to exhibit empathic or altruistic behaviour and hold similar attitudes. They state that females show greater levels of prosocial caring, moral judgment and reasoning than males, nonetheless, do exhibit empathic prosocial behaviour although Christov-Moore and Simpson (2014) suggests the motivations are different. Females are more likely to exhibit benevolent or empathic behaviours

based on the emotive, whereas males are greater influenced by verifiable information, in other words, what they believe people must do. Additionally, the meta-analysis revealed that through questionnaire data, females generally felt happier about their altruism while male data on the other hand showed evidence that the appearance of being altruistic was the main motivation. For additional research it would be beneficial to further explore the area of attitudes towards persons with an acquired brain injury through the lens of altruism and gender differences. As mentioned within the literature review in chapter 1, community reintegration is paramount to favourable rehabilitation outcomes for survivors. As many individuals attempt to re-enter the workforce either part of their rehabilitation or as a goal to work towards, a main area of examination would encompass applied intervention to make this transition as positive as possible.

The mean results for authoritarianism in both conditions as well as across both genders are low, this further indicates positive attitudes. This demonstrates a less coercive and hands on approach to persons with an ABI. The scores demonstrated within the study are important to highlight. Right wing authoritarian attitudes have been linked to resistance towards outgroups and hostility towards mental health facilities in the area. Furr, Usui and Hines-Martin (2013) omnibus survey consisted of 771 participants, the data highlighted that participants who scored high on Altemeyer's (1989) right-wing authoritarian scale were more likely to foster negative attitudes towards the establishment of mental health services and the mentally ill. Kenny, Bizumic and Griffiths (2018) postulate that authoritarianism is the one of the main predictors of stigma and prejudice towards outgroups and the mentally ill. The increased threat to values and way of life due to the integration of those identifiable to an outgroup often results in mechanisms that actively isolated and restrict the individual. Link and Phelan (2001) propose that stigmatisation happens as a result of multiple processes; stereotyping, labelling, separation from society, a loss of status, discrimination systems and the

influence of power, work together simultaneously in the creation of stigma. Furthermore, they state that in the absence of implementing one of these strategies another is employed. It seems evident that the authoritarian attitudes towards outgroups and the mentally ill employ these stratagems. Kenny, Bizumic and Griffiths (2018) state authoritarianism in relation to mental illness is likely related to the ideology, personality and the previous life experiences of an individual. Furthermore, the ideology of authoritarian individuals is less likely influenced by contact with outgroups and more heavily based on an ideology.

Additionally, the multiple regression further supports the concept that both authoritarianism and benevolence are strong predictors of attitudes towards persons living with an ABI, while age and gender proved to not be significant predictors. It appears evident from the available research that both benevolence and authoritarianism are most influential when determining attitudes towards the mentally ill and other outgroups. Kenny, Bizumic and Griffiths (2018) discovered that those demonstrating high levels of authoritarianism also demonstrated low levels of empathy towards the mentally ill. The data displayed that low levels of benevolence is a direct influence of malevolence, high levels of social dominance orientation proving to be the main drive behind behaviours that discriminate. The intertwining of the stigmatisation procedure proves to be nuanced with overlapping psychological theories along with attitudes becoming multi-layered, for instance; Link and Phelan's (2001) definition of stigma is an attempt to conceptualise and measure the phenomena. However, it is clear that each process within the definition are propelled by more deep-set attitudes often formed through, societal circumstances, political climate, religious ideology and life experience.

In relation to this research project, the information available on the influences benevolence and authoritarianism shows the importance in promoting interventions to foster benevolence and mediate the impact of authoritarian attitudes. It is evident within the statistical analysis that the gamified and non-gamified conditions did not provide any significant results;

however, this may suggest further areas for research on. It is possible that the experimental effect did provide the desired outcome, however, this cannot be measured statistically as there was no pre-intervention testing. The researcher hypothesised that interaction from the gamified intervention would have more positive altitudinal outcomes. However, it is possible that the applied nature of both interventions has been successful in fostering positive outcomes. The element of psychoeducation was provided to participants on both conditions. Previous studies have showed the benefits of psychoeducational intervention for mediating stigma for mental health (Michaels et al., 2013; Ngoc et al., 2016; Kohls et al., 2017).

Education has been administered through different mediums and proved successful in the mediation of stigmatised attitudes, for instance; Villani and Kovess-Masfety (2017) administered a short training programme for health professionals and students through e-mental health. The interventions included three experimental condition with random assignment to either; information groups, expert information group or a control condition with no mental health information. The results showed that the expert information condition provided the greatest improvement to attitudes. Equally, the information provided in both conditions within this study was based on science and subject specific, this demonstrated similarities in the type of content, thus suggesting that the content of the conditions provided may have influenced positive attitudinal change. However, as in this research no baseline measure was taken, therefore further research is needed to better understand the processes influencing attitudinal change. Consequently, psychoeducation regardless of the form; gamified or non-gamified, can be influential in positive attitudinal change. There are many positives for e-mental health interventions, namely, that they are affordable, since training programs can prove expensive. App-based interventions gamified or otherwise reach more individuals with ease for example: an applied intervention that would more usually be rolled out within an organisation may now be available to the general public through e-mental health and device applications. Salier et al.

(2016) suggested that exposure to more salient aspects of the mentally ill, i.e. more time spent or a greater "dose" of emotive information and/or story telling may provide an attitude change. Also providing a greater sense of task meaningfulness within applied gaming, however, some research suggests that information-based intervention may be more beneficial (Villani and Kovess-Masfety 2017). Nevertheless, due to the non-significant results of this study it is important that these results are not inflated, but more so, reflected on as possible outcomes and a direction for future research within applied health psychology.

Due to the lack of recent quantitative research on stigma and ABI this study does add to the literature. As discussed within the literature review in chapter 1, community reintegration is paramount to favourable rehabilitations outcomes. Providing accessible information widely to the general public along with raising awareness through continued psychological research that pertains to both persons with an ABI and the external processes that influence rehabilitation outcomes.

Limitations

A main limitation within this study was the omission of baseline a measure. The inclusion of a baseline measure would have provided the researcher with concurrent data for comparison to analyse the outcomes further. Even so, this research is preliminary and provides basis for further analysis. It is recommended that due to the positive altitudinal outcomes, further research needs to explore psychoeducation and attitudes towards ABI while measuring baseline attitudes. The importance of quantitative research within this area is paramount, nevertheless, qualitative analysis on community attitudes towards ABI would also be beneficial. The researcher received multiple correspondence from participants highlighting the impact of both the knowledge and gamified condition, many stating that they were unaware of ABI, and the prevalence and the implications that can follow. This information may have added to this study; however, it is suggested that this method would prove more impactful as part of

a longitudinal mixed methods design, thus allowing researchers to gather more meaningful data for analysis. Future research within this area should consider longitudinal

Dissemination plan

To ensure the valuable findings from this research informs further practice and increases the knowledge surrounding all areas within this study, the following dissemination plan has been devised. The purpose of this dissemination plan is to transform the current knowledge into informed practice. Effective research dissemination happens when multiple conduits are implemented, with the aspect of face to face collaboration. The full dissemination is as follows.

The Neuro-Rehab Times (*appendix* K) have sought out an interview with the researcher, to discuss valuable findings and recommendations has been arranged. The Neuro-Rehab Times, is the leading neurorehabilitation magazine within the UK and Ireland, the interview will bring the research into the mainstream making it accessible to anyone that may have an interest in neurorehabilitation. Their audience ranges from; professional, family members and survivors. The researcher will seek out publication within the "IOS Neurorehabilitation, An Interdisciplinary Journal" (see *appendix* L) a peer reviews journal. The objective of this journal is to provide evidence-based practice for neurorehabilitation practitioners. This study will be submitted electronically to the journals management system also after reading the publication ethical guidelines. As of July 1st 2020, the fee for publishing with IOS is €450.

Social media is a valuable resource for the dissemination of academia today. The effective use of social media can assist the researcher to seek out their target audience and create further exposure. The study will be shared predominately on Linkedin and Twitter as this facilitates succinct messages, engages readers and increases engagement with the publication. This engagement will create connections with other researcher in similar fields

and identify further areas of research encouraging improved communication internationally. The use of twitter will be used to tag work and researchers, for example; IOSPress and Neureka, - a Trinity College Global Brain Health Institute - an initiative developing app-based games to support researchers in identifying individual who may be predisposed to dementia identified by biomarkers.

The DANA foundation (*appendix M*) will be contacted regarding Brain Awareness Week and submitting a report. As of now the 2020 brain awareness week and the option to speak at a conference and/or hold an event is on hold due to the COVID-19 pandemic. The researcher will send an email to flag the interest in disseminating the research findings. Additionally, the Neurological Alliance of Ireland will be contacted regarding upcoming conferences for 2020/21. The NAI hold a yearly brain awareness week conference in conjunction with the DANA Foundation, the researcher will make contact with the NAI regarding this. Either way, presenting during the Brain Awareness Week will be beneficial in the dissemination of the applied research.

Acquired Brain Injury Ireland (see *appendix N*) partner with Dublin City University, Traumatic Brain Injury Road to Recovery and the Global Brain Health Institute. There is an option to submit research findings with ABI Ireland, at present the researcher is in employment here, contact has been made requesting a meeting discussing the options for dissemination with ABI Ireland. Finally, the Health Service Executive (HSE) established the National Strategy and Policy for the Provision of Neuro Rehabilitation Services in Ireland for 2019/2021 - from theory to action. This policy recognises the needs for empirical evidence-based research and interventions as well as providing a positive environment for community-based rehabilitation (see *appendix* O).

This proactive dissemination plan has the breadth to reach many spectators and consumers; professionals, students, survivors, family members and the general public. It upholds the applied nature of this research offering real world application within the community and therapeutic sphere. Moreover, as information is widely and quickly available through social media this dissemination plan implements stratagem that mobilises the information promptly and up to date with the medium used.

Chapter 5. Conclusion and Recommendations

It is noteworthy that the analysis for experimental conditions were non-significant, this research study highlights many areas for further research and draws conclusions based on the results. The importance of authoritarianism and benevolence are highlighted within the discussion along with the lack of difference between groups. This is the first study that amalgamates; ABI, stigma and psychoeducation using gamification and experimental design. The results and analysis are a basis to spearhead further research. The main implication is the acknowledgement that psychoeducation may be the main factor at play here. There is sufficient research mentioned that supports this, therefore, this conclusion may be drawn, however, as previously stated, it is imperative not to inflate the outcomes. As discussed, the implications for rehabilitation are largely implicated by community reintegration, with a significant barrier proving to be internalised stigma and perceived negative attitudes. The internalised stigma felt by ABI survivors is largely due to the perception of how the believe others see them, as well as being met with a barrage of questioning about ABI. This type of exposure can, at times, prove all too stressful and exposing for survivors (Lowe, Wilson, Crawley and Waldron 2018). Exposure can often times lead to feelings of isolation, however, the subscale scores for all participants across the board suggests as a whole the attitudes towards ABI are positive in all areas, including community mental health ideology which suggests that there is openness to local services. It is recommended that further research attempts to bridge the gap in this realm, enabling ABI survivors to gain knowledge that the general public hold positive views. It is hoped these types of interventions will encourage positive rehabilitation as community reintegration becomes less daunting As stigma and ABI is largely an under researched area, it is interesting to note that little is known about public attitudes within Ireland especially, there may be a dissonance at play between the general public and survivors. Even so, this may have

been shown to be the case due to the information provided the participants. With the absence

of baseline measurement, it is not possible to conclude with this. Evidently, the employment

of researching stigma and ABI is still in its infancy with much work to be done going forward.

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Appendices

Appendix A

True or False quiz questions for experimental and knowledge conditions.

1. On average in Ireland 13,000 people acquire a brain injury per year.

2. Even after several weeks in a coma, when people wake up, most recognize and speak to others right away

3. After a head injury, people can forget who they are and not recognize others but be perfect in every other way.

4. A little brain damage does not matter since people only use a small portion of their brains anyway

5. How quickly a person recovers from head injury depends mainly on how hard they work at recovering

6. Inflammation in the brain is not that serious.

7. A concussed person should stay in a dark room and limit brain and body activity for 1-2 weeks following the evening of the concussion

8. Some neurons die with an acquired brain injury

9. Concussion is the most common type of acquired brain injury

10. People who have had one head injury are less likely to have a second one

11. After a head injury it is usually easier to learn than before the injury

12. Injuries to the neck can cause brain damage even if there is no direct blow to the head

13. A concussion is harmless and can't results in long-term problems or brain damage

14. An X-ray is the only way to know if someone has an acquired brain injury

15. You can tell if a person has an acquired brain injury by the way the look.

16. An brain injury caused by an external physical force is a traumatic brain injury

17. A person who has recovered from a head injury is more able to withstand a second

blow to the head

Appendix B

Fact Sheet for knowledge condition

ABI

A fact sheet for acquired brain injury (ABI)

- On average 13,000 people a year are diagnosed with an ABI in Ireland.
- Several weeks after a coma survivors are not likely to recognise and speak to others right away.
- Post head injury if survivors forget who they are and are unable to recognise those around them it is unlikely they will be perfect in every other way.
- The myth that we only use 10% should be ignored, brain damage in any capacity is serious.
- Recovery can be a very slow process despite how hard a survivor works.
- Inflammation of the brain is a very serious condition and needs immediate attention.
- Previously it has been thought that after a concussion you should stay in a dark room and limit all activity, recent research has found that, activity and mental stimulation is important after a concussion.
- Neuronal death is very common after suffering and ABI.

- Those who have suffered an ABI are more likley to have a second one.
- Learning post injury can prove very difficult.
- Injuries to the neck can cause significant brain damage.
- A concussions can be harmful and can result in long term problems or brain damage, be sure to see a health professional if symptoms persist.
- An X-ray is not the only way to diagnose an ABI, a tool known as the Glasgow Coma Scale is implemented.
- You cannot tell if someone has suffered an ABI by looking at them, further investigation is needed.
- A brain injury caused by an external force penetrating the skull is know as a Traumatic Brain Injury (TBI) this falls under the canopy of acquired brain injury.
- Somebody who has recovered from a head injury is less able to withstand a second blow to the head.

► Headway (2019), Brainline (2018), Acquired Brain Injury Ireland (2018)

Appendix C

Revised CAMI Scale

The following statements express various opinions about acquired brain injuries and the

mentally ill. The mentally ill refers to people needing treatment for mental disorders but who

are capable of independent living outside a hospital. Please circle the response which most

accurately describes your reaction to each statement. It's your first reaction which is

important. Don't be concerned if some statements seem similar to ones you have previously

answered. Please be sure to answer all statements.

SA: Strongly Agree

A: Agree

N: Neutral

D: Disagree

SD: Strongly Disagree

    a.   As soon as a person shows signs of mental disturbance, he should be hospitalized.

<div align="center">SA   A   N   D   SD</div>

b. More tax money should be spent on the care and treatment of people with an ABI.

SA A N D SD

c. Those with an ABI should be isolated from the rest of the community.

SA A N D SD

d. The best therapy for many ABI patients is to be part of a normal community.

SA A N D SD

e. Acquired brain injury is an illness like any other.

SA A N D SD

f. Those with an ABI are a burden on society.

SA A N D SD

g. Those with an ABI are far less of a danger than most people suppose.

SA A N D SD

h. Locating ABI facilities in a residential area downgrades the neighbourhood.

SA A N D SD

i. There is something about those with an ABI that makes it easy to tell them from normal

people.

SA A N D SD

j. Those with an ABI have for too long been the subject of ridicule.

SA A N D SD

k. A woman would be foolish to marry a man, who has suffered from acquired brain injury,

even though he seems fully recovered.

SA A N D SD

l. As far as possible ABI services should be provided through community-based facilities.

SA A N D SD

m. Less emphasis should be placed on, protecting the public from those with an ABI.

SA A N D SD

n. Increased spending on ABI services is a waste of taxes.

SA A N D SD

o. No one has the right to hose with an ABI from their neighbourhood.

SA A N D SD

p. Having ABI patients living within residential neighbourhoods might be good therapy, but

the risks to residents are too

great.

SA A N D SD

q. ABI need the same kind of control and discipline as a young child.

SA A N D SD

r. We need to adopt a far more tolerant attitude toward those with an ABI in our society.

SA A N D SD

s. I would not want to live next door to someone who has an ABI.

SA A N D SD

t. Residents should accept the location of ABI facilities in their neighbourhood to serve the

needs of the local community.

SA A N D SD

u. Those with an ABI should not be treated as outcasts of society.

SA A N D SD

v. There are sufficient existing services for those with an ABI.

SA A N D SD

w. Those with an ABI should be encouraged to assume the responsibilities of normal life.

SA A N D SD

x. Local residents have good reason to resist the location of ABI services in their

neighbourhood.

SA A N D SD

y. The best way to handle those with an ABI l is to keep them behind locked doors.

SA A N D SD

aa. Anyone with a history of an ABI should be excluded from taking public office.

SA A N D SD

bb. Locating ABI services in residential neighbourhoods does not endanger local residents.

SA A N D SD

cc. ABI hospitals are an outdated means of treating the mentally ill.

SA A N D SD

dd. Those with an ABI do not deserve our sympathy.

SA A N D SD

ee. Those with an ABI should not be denied their individual rights.

SA A N D SD

ff. ABI facilities should be kept out of residential neighbourhoods.

SA A N D SD

gg. One of the main causes of acquired brain injury is a lack of self-discipline and will power.

SA A N D SD

hh. We have the responsibility to provide the best possible care for those with an ABI.

SA A N D SD

ii. Those with an ABI should not be given any responsibility.

SA A N D SD

jj. Residents have nothing to fear from people coming into their neighbourhood to obtain

ABI services.

SA A N D SD

kk. Virtually anyone can acquire a brain injury.

SA A N D SD

ll. It is best to avoid anyone who has an ABI

SA A N D SD

mm. Most women with an ABI can be trusted as baby sitters.

SA A N D SD

nn. It is frightening to think Those with an ABI living in residential neighbourhoods.

SA A N D SD

Appendix D

Key to CAMI Scale Items Scoring

SA A N D SD

Authoritarianism

 Pro: a, i, q, y, gg 54321

 Anti: e, m, u, cc, kk 12345

Benevolence

 Pro: b, j, r, z, hh 54321

 Anti: f, n, v, dd, ll 12345

Social Restrictiveness

 Pro: c, k, s, aa, ii 54321

 Anti: g, o, w, ee, mm 12345

Community Mental Health Ideology

 Pro: d, l. t, bb, jj 54321

 Anti: h, p, x, ff, nn 12345

Appendix E

Informed Consent

My Name is Aisling and I am conducting an experiment on attitudes relating to ABI

(Acquired Brain Injury) as part of an MSc in Applied Psychology at Dublin Business School.

Acquired Brain Injury is a canopy term used for

a head injury that is identified after birth that excludes neuro-degenerative diseases

(Headway, 2015). The experiment has two conditions, both involving information about ABI

(in either a quiz or reading format), followed by questions on ABI knowledge and attitudes

towards it. Participants will be randomly assigned to an information condition. Taking part

will take approximately 45 minutes and will be anonymous.

You can stop participating at any time during the experiment by simply closing the window

or NOT pressing 'submit' at the end, but once you have pressed 'submit' it will not be possible

to remove your data from the experiment as the anonymous nature means your answers will

not be identifiable. The anonymous data will be kept in a secure format (password protected)

for one year. By taking part you can help scientists learn more about improving attitudes to

ABI.

 If you have any questions about the research you can contact me on 10503637@mydbs.ie

Kind regards,

Aisling Graydon

Appendix F

Debriefing form

Thank you for agreeing to participate in this study! The general purpose of this research is to assess levels of stigma in relation to acquired brain injury as well as assessing the effectiveness of gamification in the mediation of stigma.

Thank you for your participation in this study. If you have further questions about the study, please contact Aisling Graydon. I understand that the investigator is willing to answer any inquiries I may have concerning the research herein described. I understand that I may contact Aisling Graydon (10503637@mydbs.ie) if you have any other questions.

If you have any further questions about acquired brain injury or feel this may directly affect you or a family member please feel free to click on the resources listed below.

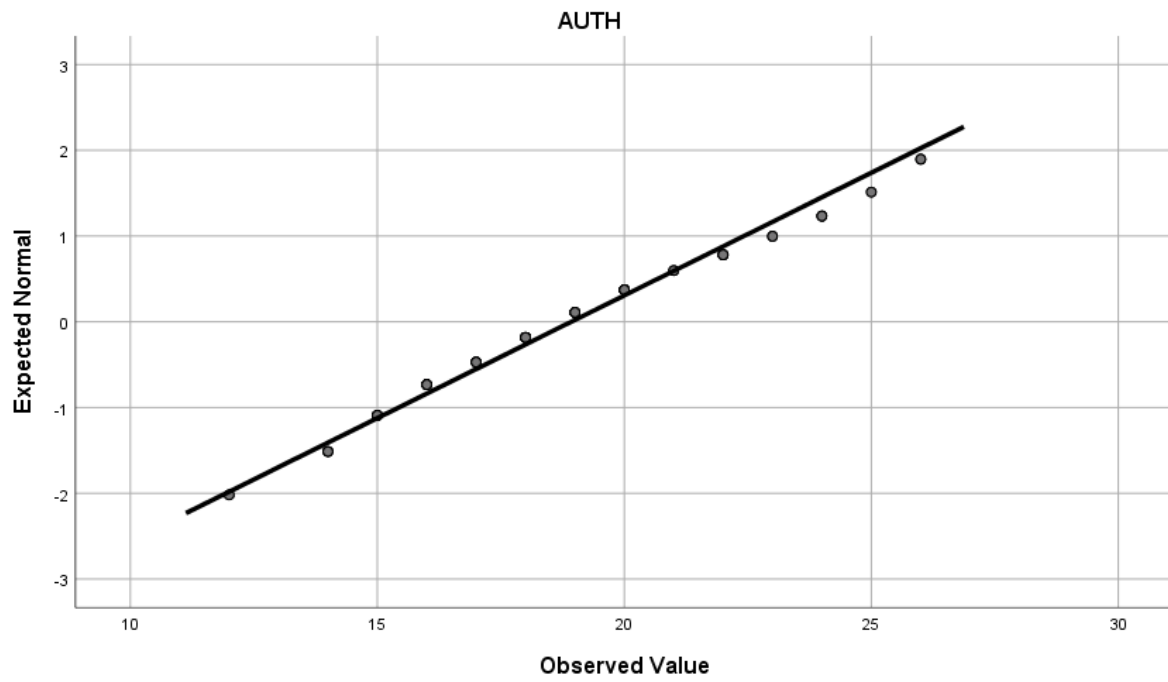https://www.abiireland.ie/

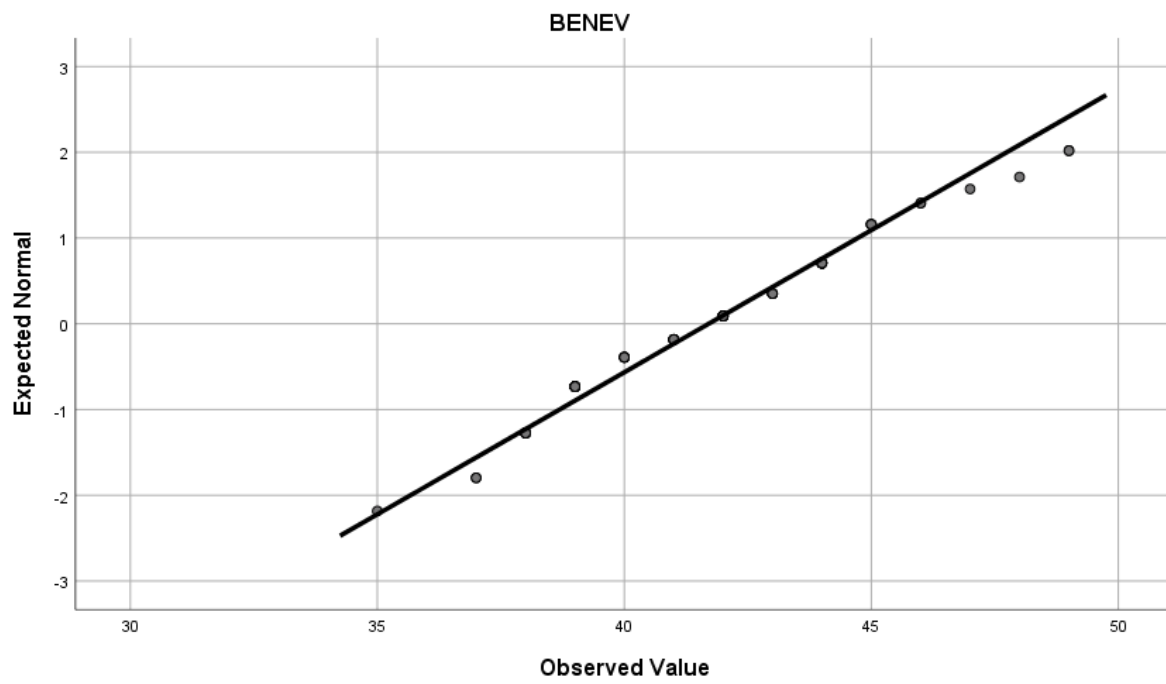https://headway.ie/

Kind regards,

Aisling Graydon

Appendix G

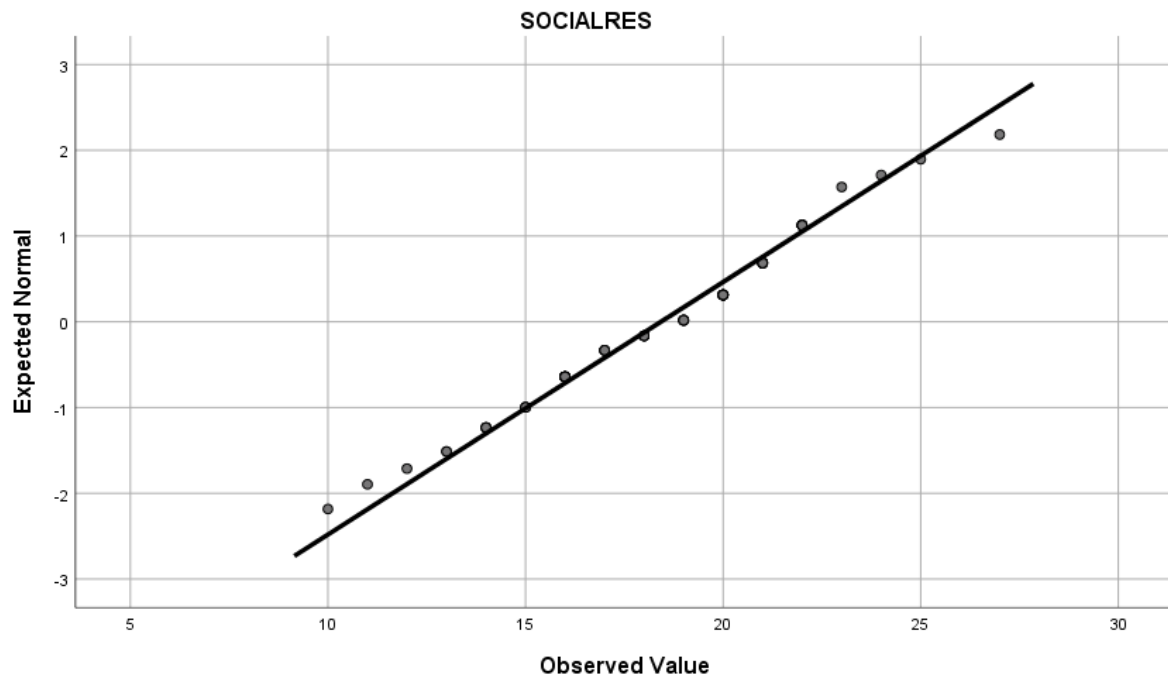Normality Q Plot for authoritarianism

Appendix H

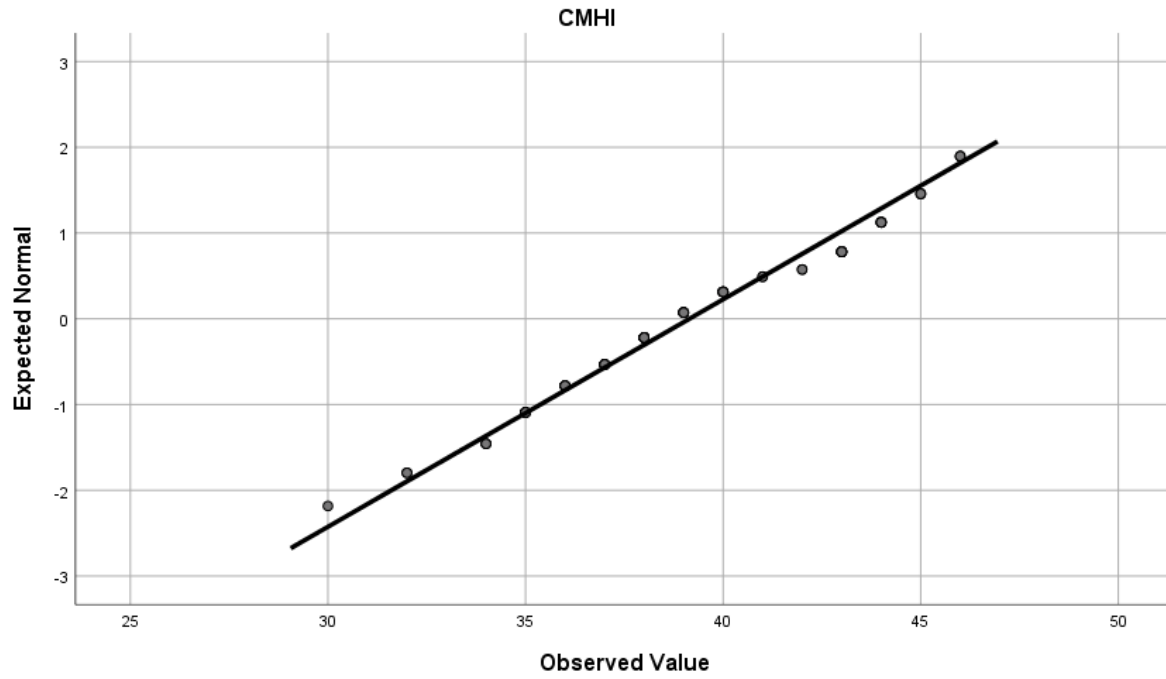Normality Q Plot for benevolence

Appendix I

Normality Q Plot for social restrictiveness

Appendix J

Normality Q Plot community mental health ideology

Appendix K

Likert scale for levels of funnes

I had fun partaking in this gamification process

1   2   3   4   5   6   7   8   9 10

(1-not at all, 10 very much so)

Appendix L

Link to neuro-rehab times

https://www.nrtimes.co.uk/

Appendix M

Link to IOS journal

https://www.iospress.nl/journal/neurorehabilitation/

Appendix N

Link to DANA website

https://www.dana.org/

Appendix O

Link to ABI Irelands research page

https://www.abiireland.ie/i-need-to-know-more-about-research/research-partners/