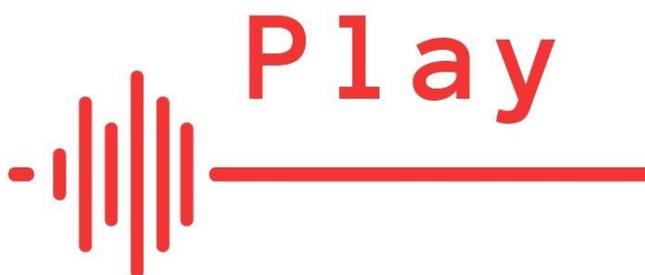


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PLAY: “Play, Learn, fight back Anxiety”



Del-03-IO1 Virtual World Surveys

Intellectual Output or Activity Number	Del-03-IO1 Virtual World Surveys
Short Description	Creation of surveys related to student's mental health and anxiety levels to be implemented in the environment. Students will have the option to choose if they prefer to take the surveys or not, and they can do this anonymously and conveniently from their place using the virtual environment.
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List of abbreviations

3DVW	3-Dimensional Virtual World
PLAY	Play, Learn and fight back Anxiety
CBT	Cognitive Behavioural Therapy

1. Introduction

This document outlines Deliverable 3 (Intellectual Output 1) – Virtual World Surveys. Within the PLAY 3D virtual world, students will be able to participate anonymously in surveys related to their mental health and anxiety levels. The students will have the option to choose if they prefer to take the surveys or not and they can do this anonymously, and conveniently from the own place using the virtual environment. The surveys will also provide university disability/mental health supports services to monitor the mental health needs of students. The design of these surveys is the goal of this task. The aim is to identify a short and efficient instrument that will be implemented within the environment for player. The results will be available to players (students) as well as other users (e.g. college support staff/counsellors) and will provide insight into mental health needs and help to build mental health awareness.

1.1. Background

The journey through higher education typically coincides with early adulthood and is recognised as an important transitional developmental period. During this stage, individuals can be at increased risk of poor wellbeing. Early adulthood can be a sensitive period for mental health, with difficulties typically first emerging between 18 to 25 years of age (Kessler & Wang, 2008). Additionally, entry into higher education can be associated with many pressures which can increase the risk of mental health problems emerging, including: entry into an unstructured learning environment from a structured school environment; financial stressors and additional work commitments; moving away from support systems (family and friends); social stressors; and increased academic demands and pressures (Price, Smith & Kavalidou, 2019; Conley et al., 2020).

Recent research has indicated that students with the higher education sector are reporting significantly increased levels of mental health difficulties (e.g. Dooley et al., 2019; Macaskill, 2012; Rüscher et al., 2014). Indeed, studies have reported that as many as one in every four university students experience mental health difficulties at some point in their academic life (Pereira et al., 2018), whilst almost 40% of students in higher education experience elevated levels of anxiety (Price et al., 2019). Worryingly, self-harm behaviours and the use of negative coping strategies such as substance abuse and/or emotional withdrawal are also on the rise (Conley et al., 2020; Pereira et al., 2018).

The emergence of these problems has posed significant challenges for university support services. The numbers of students seeking help for mental health difficulties through their university's disability services has now increased by almost 130% (Macaskill, 2013; Price et al., 2019; Reetz et al., 2014;) - a statistic which is further illustrative of the escalating rate of mental health disturbances amongst those attending higher education, but also suggests a potential strain on the university-based services which cater to and support students experience adjustment problems during third level education experiences. These figures may actually be under-representative of the true extent of the problem, as many students may be prevented from reporting their difficulties due to a sense of stigma or fear, and/or may not receive adequate support due to long wait-times and difficulties accessing over-burdened services (Shann et al., 2019).

Nevertheless, supports for students which can help them navigate the stressors of university life and learn positive coping strategies for overcoming stress and anxiety are a significant priority, particularly in a context of increased demand and strained resources. It is also necessary for universities and/or higher educational institutions to develop systems to monitor and evaluation the mental health needs of their students, as well as the reach, impact and effectiveness of the services and supports which they offer students (Beiter et al., 2015).

1.2. Play, Learn and fight back Anxiety

PLAY is a new cross-European, Erasmus+ funded project. PLAY stands for Play, Learn and fight back Anxiety. The primary aims of PLAY are to help university students become better prepared for university curricular activities, to help them reduce their anxiety and strengthen their awareness of mental health and positive and proactive coping strategies. PLAY will develop an innovative scenario-led, gamified tool with which university students can engage. This will involve the design and development of a 3D virtual world which aims to support students in learning a range of skills and strategies for overcoming the stresses and anxiety associated with university life.

More specifically, The PLAY 3D virtual world involves a psychoeducational gamified approach to promoting student wellbeing. The virtual world comprises a suite of scenarios that allow a player (university student) to engage with stressful circumstances related to university life (the selection of these circumstances was guided by the focus groups with students).

Gamified elements allow players to develop knowledge and gain skills related to overcoming stress and anxiety, whilst psychoeducational material built into the world also help to strengthen student awareness of mental health difficulties and strategies for overcoming stresses, as well as positive approaches to wellbeing.

Within the environment, players are tasked with helping other students (non-player characters) who are present in the environment and are experiencing stress and anxiety. In line with a CBT-based approach, interactions between the player and the non-player characters provide students insights into cognitive distortions associated with anxiety, as well as the physiological symptoms of stress and anxiety, as well as the links between thoughts, feelings and behaviour. A coach is also present in the environment, who can provide “guidance” in helping participants recognise faulty thought patterns and the physical signs and symptoms of stress and anxiety. Gamified elements also allow players to gain positive coping skills and strategies for overcoming university related challenges.

Overall, PLAY consists of several elements which allow students to progressively understand their mental health needs (including physiological/psychological symptoms) and to learn coping skills to deal with the challenges of university life (e.g. managing the symptoms of anxiety, developing social skills and coping mechanisms). The approach to the game is guided by CBT and is representative of the typical progression of this approach to tackling mental health difficulties (see Appendix 1 for the scenarios within the PLAY 3D virtual world).

2. Monitoring wellbeing in students

The education sector has a significant role to play in supporting and encouraging the development of its students. Universities can help to promote all-round personal development, including the interpersonal, behavioural and emotional growth of students, rather than academic growth alone. Increasingly, higher educational settings are committing to promoting the “wellbeing” of its students. Thus, it is increasingly important for these educational institutions to develop a good sense of the mental health and wellbeing needs of their students. Monitoring and surveying systems which gather information on student wellbeing can help to build an understanding of the types of difficulties and challenges that students’ experiences as well as their support needs across social, behavioural, emotional and academic spheres. This in turn can help universities to put in place appropriate services and supports to hold their students with mental health difficulties (Masters, 2004).

Awareness of student mental health and wellbeing amongst the staff and student body may also be beneficial. Building and strengthening awareness of mental health more generally can play an important role in tackling stigma and reducing associated effects. Educators may also be better able to support their students and optimise their capacity to create a culture of care within the university environment. Additionally, at the student level, creating better awareness of mental health needs, may help to support enhanced action in terms of support seeking and the use of positive, proactive coping strategies (Hyun et al., 2006).

2.1. Monitoring student mental health in the 3D virtual world

The development of the PLAY 3D virtual world provides an opportunity to create a mental health “screening” system, whereby users (both the university mental health/disability services and students themselves) can monitor the overall mental health of their students via an embedded survey. The surveys will be designed to allow monitoring of mental health and wellbeing. Players/Students will have the option to participate in monitoring surveys on an anonymised basis. The aim is to be short and efficient instrument that will be implemented in the environment.

2.1.1. Survey development – Key tasks and activities

This work involved a desk-based scoping exercise led by ICEP Europe to assess and finalise the proposed survey methodology. It should be noted that both ICEP Europe and ISMAI bring significant psychological expertise and experience to the PLAY consortium. Thus, a significant aspect of informing the survey development/selection involved the professional experience and expertise of the team members – including knowledge and awareness, as well as past practice, of using relevant measures. Overall, liaison and consultation across the PLAY consortium were also important to finalisation of this deliverable.

The desk-based scoping exercise involved: (i) a rigorous search and review of existing surveys/instruments designed to measure mental health and wellbeing; and (ii) a critical evaluate of their utility within the PLAY 3D virtual world. Key issues for the selection and critique of relevant survey instrumentation were identified by thorough and careful discussion amongst the consortium relating to the development of appropriate tools which would be relevant to the aims of PLAY.

The key issues in the identification of the surveys were as follows:

- Relevance to general mental health and wellbeing
- Relevance to population (age, gender)
- The psychometric properties of the questionnaire/survey (reliability, validity)
- Length and time needed to complete the survey (short)
- Language (accessibility, translated across different languages)
- Costs (e.g. free to use)
- Ethical considerations (e.g. collection of anonymised data, confidentiality of survey users, the nature of data collected)

As outlined above the process of identifying appropriate tools for the 3D virtual world involved a two-step process. The first step in this process involved a review of relevant instruments in order to identified tools which may fit with the key needs of the PLAY programme. This review was led by ICEP Europe as they were identified as best placed to identify appropriate psychological tools which would be valid and reliable and which would match with the needs of and requirements of the programme and the 3D virtual world.

This search involved:

- A review of relevant psychological literature and relevant research (e.g. mental health research with university students/young people; evaluations/assessments of interventions for anxiety, stress and depression in relevant populations; evaluations of computer-focused and/or online interventions for stress/anxiety and/or depression; research on gamified approaches to mental health difficulties)
- Psychometrically-focused research on mental health questionnaires / inventories (i.e. assessments of the factor structure, validity, reliability, etc of these types of instruments in relevant populations, particularly university-based populations and / or adolescents and young adults.
- Research using mental health questionnaires in the relevant partner countries (specifically Ireland, Greece and Portugal)

This reviewing and auditing process led to the identification of a “short-list” of surveys which could be embedded within the PLAY virtual world. These **surveys** are listed and described below:

- *Warwick-Edinburgh Mental Well-being Scale (WEMWBS; Tennant et al, 2007)*

The WEMWBS is a 14-item self-report measure of general mental health and wellbeing (during a previous 2-week period) including both hedonic (subjective experience of happiness and life satisfaction) and eudemonic (psychological functioning and self-realisation) perspectives and also incorporating positive affect (e.g. optimism) and positive functioning (e.g. energy, clear thinking). It comprises five response categories from ‘none of the time’ to ‘all of the time’ scored from 1 to 5 respectively and summed to give an overall score (14-70); higher scores indicate higher levels of mental well-being. As above, the measure is psychometrically sound with good reliability (e.g. Cronbach’s alpha of 0.91; one-week test-retest reliability of 0.83), adequate content validity and high correlations with other mental health and well-being scales.

- *Positivity Scale Short Form (PSSF; Narvaez, 2006)*

The Positive Scale Short Form is a brief, 5-item questionnaire that measures personal optimism (e.g. I have important goals for my life). Items reflect self-efficacy in being able

to succeed in life (e.g. I believe that my future will work out) and are rated on a 5-point Likert-type scale for each item (always agree to never agree).

- *Depression, Anxiety and Stress Scale (DASS; Lovibond & Lovibond, 1995)*

The DASS is a set of three self-report scales designed to measure the negative emotional states of depression, anxiety and stress. The principal value of the DASS is its ability to identify clinically significant emotional disturbances. The DASS scales each contains 14 items, divided into subscales of 2-5 items with similar content. The Depression scale assesses dysphoria, hopelessness, devaluation of life, self-deprecation, lack of interest/involvement, anhedonia, and inertia. The Anxiety scale assesses autonomic arousal, skeletal muscle effects, situational anxiety, and subjective experience of anxious affect. The Stress scale is sensitive to levels of chronic non-specific arousal. It assesses difficulty relaxing, nervous arousal, and being easily upset/agitated, irritable/over-reactive and impatient. Subjects are asked to use 4-point severity/frequency scales to rate the extent to which they have experienced each state over the past week. Scores for Depression, Anxiety and Stress are calculated by summing the scores for the relevant items. A short version of the DASS is also available with 7 items per scale (21 items). Overall, the DASS has been shown to have high internal consistency and to yield meaningful discriminations in a variety of settings. It is widely used in clinical settings and in research and can be used to measure current state or change in state over time on the three dimensions of depression, anxiety and stress.

- *Beck Anxiety Inventory (BAI; Beck & Steer, 1988; Beck et al., 1988).*

The Beck Anxiety Inventory is a 21 item, self-report measure of anxiety. It is a proprietary measure which assesses the occurrence of a common list of anxiety symptoms. It has been found to have good discriminative validity, as well as high internal consistency and test-retest reliability. It is a brief easy to use measure.

- *Perceived Stress Scale (Cohen et al., 1983)*

The Perceived Stress Scale (PSS) is a brief, 10-item scale and is a widely used psychological instrument for measuring the perception of stress. It is a measure of the degree to which

situations in one's life are appraised as stressful. Items were designed to tap how unpredictable, uncontrollable, and overloaded respondents find their lives. The scale also includes a number of direct queries about current levels of experienced stress. The PSS was designed for use in general samples and uses accessible language. It can be easily understood and quickly implemented. The scale also has good reliability and validity.

- *State-Trait Anxiety Inventory (STAI; Spielberger et al., 1964).*

The State-Trait Anxiety Inventory is a well validated and widely used measure of state and trait anxiety. The self-report assessment measure contains 20 items and has been adapted for use across several languages. The measure has been found to have good reliability and validity and has been used in both clinical and research settings.

2.1.2. Survey development – Critiquing potential surveys

After identifying a shortlist of six potential surveys which could be embedded in the 3D virtual world, the second step in the process began. This involved, firstly, a critique of each of the surveys against the key issues which were identified by the PLAY consortium as being important to the goals of the programme. This was then followed by a discussion amongst the consortium of the findings of the critique and a final decision regarding the best measures/survey tools to embed within the PLAY 3D virtual world was then taken. The initial critiquing process involved assessing each survey against key criteria (as outlined above: Relevance to general mental health and wellbeing; Relevance to population; Psychometric properties; Ease of use; Language; Costs; and Ethical considerations) to determine key differentiating characteristics between the surveys. This process was particularly oriented towards ascertaining surveys strengths and/or potential drawback / weaknesses which would be important to the aims and objectives of the PLAY 3D virtual world (See Deliverable 01). Thus, each of the surveys was assessed in more detail to determine which would be best suited to the needs of the PLAY programme. The findings of this process are outlined below.

Warwick-Edinburgh Mental Well-being Scale (WEMWBS; Tennant et al, 2007)		
	Strengths	Weaknesses
Relevance to general mental health and wellbeing	<ul style="list-style-type: none"> • General measure – assesses positive aspects of wellbeing and mental health 	<ul style="list-style-type: none"> • Does not assess clinical symptoms of anxiety, stress and depression
Relevance to population	<ul style="list-style-type: none"> • Used widely in studies with student / university student populations including in the UK, Ireland, Italy, Brazil, China, 	
Psychometric properties of the questionnaire	<ul style="list-style-type: none"> • Very good – well validated • Good predictive and discriminative validity • Cut-off scores available to aid interpretation of data for a student / youth and adult population 	
Length / time needed to complete the survey	<ul style="list-style-type: none"> • Brief and easy to use • Can be easily understood 	
Language (translated survey available)	<ul style="list-style-type: none"> • Available in English; Portuguese; Italian • Easily translatable 	<ul style="list-style-type: none"> • Not currently available in Greek
Costs	<ul style="list-style-type: none"> • Free 	
Ethical considerations	<ul style="list-style-type: none"> • None • Does not capture highly sensitive data 	
Overall assessment	<ul style="list-style-type: none"> • Survey has significant strengths including its excellent psychometric properties, availability and translatability. It can also be implemented without significant ethical concerns and provides a well-rounded picture of mental wellbeing • However, it cannot be used to assess clinical levels of stress, anxiety or depression 	

<i>Positivity Scale Short Form (PSSF; Narvaez, 2006)</i>		
	Strengths	Weaknesses
Relevance to general mental health and wellbeing	<ul style="list-style-type: none"> Assesses positivity 	<ul style="list-style-type: none"> Assesses a limited aspect of wellbeing – may not provide complete picture of wellbeing Does not assess clinical symptoms of anxiety, stress and depression
Relevance to population	<ul style="list-style-type: none"> Studies conducted with a student population in the US, Ireland, 	<ul style="list-style-type: none"> No cut-off scores available – to aid interpretation of the data for users
Psychometric properties of the questionnaire	<ul style="list-style-type: none"> Very Good 	<ul style="list-style-type: none">
Length / time needed to complete the survey	<ul style="list-style-type: none"> Very short – can be completed very easily Easily understood 	<ul style="list-style-type: none">
Language (translated survey available)	<ul style="list-style-type: none"> Available in English, Portuguese Can be easily translated 	<ul style="list-style-type: none"> Not currently available in Greek
Costs	<ul style="list-style-type: none"> Free 	
Ethical considerations	<ul style="list-style-type: none"> None – does not capture highly sensitive data 	
Overall assessment	<ul style="list-style-type: none"> Survey has significant strengths including its ease of use, lack of ethical concerns, availability and translatability. No cut-off scores available but the measure has an “intuitive sense” which allows it to be easily understood However, its specificity in relation to positivity may be a significant limitation – may not provide a full picture of mental health. 	

<i>Depression, Anxiety and Stress Scale (DASS; Lovibond & Lovibond, 1995)</i>		
Relevance to general mental health and wellbeing	<ul style="list-style-type: none"> Measures key variables and captures data relevant to depression, anxiety and mental health Captures clinically significant symptomology 	Designed to assess clinically significant signs of stress, anxiety and depression – may not capture social stress / sub-clinical stress and/anxiety
Relevance to population	<ul style="list-style-type: none"> Well-studied in a student population Has been used in research widely across Europe, the US and South America 	
Psychometric properties of the questionnaire	<ul style="list-style-type: none"> Well validated measure with excellent psychometric properties Norms for youth/adult populations have been provided which enables easy interpretation of scores (e.g. cut-offs which determine clinically significant symptomology for stress, anxiety and depression) 	
Length / time needed to complete the survey	<ul style="list-style-type: none"> Relatively short 	<ul style="list-style-type: none"> Longer than other measures on the short list
Language (translated survey available)	<ul style="list-style-type: none"> Available in several languages 	
Costs	<ul style="list-style-type: none"> Free to use 	
Ethical considerations		<ul style="list-style-type: none"> Generates data relevant to clinically significant symptoms
Overall assessment	<ul style="list-style-type: none"> Measure captures multiple dimensions of mental health difficulties which are relevant to the goals of the PLAY programme and has excellent psychometric properties; Has been well researched in a relevant population and has been translated into several languages Captures data relevant to clinical symptoms and therefore may generate some ethical concerns if being completed on an anonymous basis 	

<i>Beck Anxiety Inventory (BAI; Beck & Steer, 1988; Beck et al., 1988).</i>		
Relevance to general mental health and wellbeing	<ul style="list-style-type: none"> • Captures data relevant to anxiety – a key focus of the PLAY programme 	<ul style="list-style-type: none"> • Does not capture data on stress, depression or positive mental wellbeing.
Relevance to population	<ul style="list-style-type: none"> • Well researched in general population, community populations and clinical samples 	<ul style="list-style-type: none"> • Used in university samples relatively infrequently (research conducted in Brazil, Turkey, Arab university settings)
Psychometric properties of the questionnaire	<ul style="list-style-type: none"> • Excellent, well-established psychometric properties • Norms available which enables easy interpretation of scores (e.g. cut-offs which determine clinically significant symptomology for stress, anxiety and depression) 	
Length / time needed to complete the survey	<ul style="list-style-type: none"> • Brief, 21-item inventory • Easy to use 	
Language (translated survey available)	<ul style="list-style-type: none"> • Available in English and Portuguese, French and Italian 	<ul style="list-style-type: none"> • Not currently available in Greek
Costs	<ul style="list-style-type: none"> • Costs are incurred 	
Ethical considerations		<ul style="list-style-type: none"> • Generates data relevant to clinically significant symptoms
Overall assessment	<ul style="list-style-type: none"> • Instrument has excellent psychometric properties and is well established – although has only relatively rarely been used in university-based research; • Survey tool is limited to assessment of anxiety and does not capture other aspects of mental health; • Costs are incurred; • Captures data relevant to clinical symptoms and therefore may generate some ethical concerns if being completed on an anonymous basis 	

State-Trait Anxiety Inventory (STAI; Spielberger et al., 1964)		
Relevance to general mental health and wellbeing	<ul style="list-style-type: none"> • Captures data on state and trait anxiety 	<ul style="list-style-type: none"> • A significant focus of the measure is “Trait anxiety” – a stable characteristic of personality - may not be useful in capturing change over time in response to engagement with the PLAY 3D virtual world • Does not capture other aspects of mental health (stress, wellbeing)
Relevance to population	<ul style="list-style-type: none"> • Well assessed in university / student populations 	
Psychometric properties of the questionnaire	<ul style="list-style-type: none"> • Excellent psychometric properties 	
Length / time needed to complete the survey	<ul style="list-style-type: none"> • Brief 20-item inventory • Easy to use 	
Language (translated survey available)	<ul style="list-style-type: none"> • Currently available in English, Portuguese and Greek 	
Costs	<ul style="list-style-type: none"> • Costs are incurred 	
Ethical considerations	<ul style="list-style-type: none"> • None 	
Overall assessment	<ul style="list-style-type: none"> • Well-researched with a university population in several countries and is currently available across all languages relevant to the PLAY project; • Excellent psychometric properties; • Costs are incurred 	

<i>Perceived Stress Scale (Cohen et al., 1983)</i>		
Relevance to general mental health and wellbeing	<ul style="list-style-type: none"> Measures stress and daily hassles – highly relevant to PLAY 	<ul style="list-style-type: none"> Does not measure anxiety and/or depression
Relevance to population	<ul style="list-style-type: none"> Well studied in university samples 	
Psychometric properties of the questionnaire	<ul style="list-style-type: none"> Very good – very well validated Norm scores available 	
Length / time needed to complete the survey		<ul style="list-style-type: none"> Contains 40 items Much lengthier than other surveys on the shortlist Would take longer for users to complete
Language (translated survey available)	<ul style="list-style-type: none"> Available in English, Portuguese & Greek 	
Costs	<ul style="list-style-type: none"> Costs incurred 	
Ethical considerations	<ul style="list-style-type: none"> None 	
Overall assessment	<ul style="list-style-type: none"> Good psychometric properties, well-researched within relevant populations does not generate significant ethical concerns; Survey instrument is lengthier than other although is easy to use and easily understood; Only assesses perceived stress and does not capture data relevant to anxiety, stress, depression and / or wellbeing; Costs are incurred 	

3. Selection of the PLAY Surveys

Following the desk-based analysis outlined above, the consortium discussed the findings. Key issues which were considered by the PLAY team included:

- The **appropriateness** of the measures vis-à-vis the goals of the project (will the surveys allow us to capture relevant data measuring student mental health difficulties?; will they provide universities with a means of monitoring and/or understanding student mental health and wellbeing?; Are they suitable for use in an anonymous 3D virtual environment?)
- The **accuracy** of the measures (will the measures be reliable and valid and provide trustworthy insights into student mental health over time and with engagement in the PLAY 3D virtual world?; Do they provide reliable / truthful data from students?)
- The **sustainability** of the measures (can the measures be used on a continuous basis by the game developers and in the future by universities using the PLAY virtual world as a support service for university students?)

Surveys which incurred costs were eliminated as this was seen as posing difficulties to the longer-term implementation of the programme within university settings (i.e. The ongoing need to purchase a license for survey use). Ethical concerns were also seen as being very important as surveys are to be completed on an anonymous basis; however, the computer scientists on the team deemed that this difficulty could be overcome as anyone who showed particularly high clinical symptoms could be followed up through computer identification if universities have significant concerns. The relevance of the survey to the aims of the PLAY programme were also discussed and it was seen as important that the instrument captured a holistic picture of mental health and wellbeing. Thus, measures which were more general (e.g. capturing multiple and/or more holistic aspects of mental health) were seen as preferable to those which were more specific (e.g. specifically focused on stress or anxiety). Two surveys were eventually selected for inclusion within the PLAY 3D Virtual World. The selected **surveys** are:

1. *Depression, Anxiety and Stress Scale (DASS; Lovibond & Lovibond, 1995)*
(See Appendix 2)
2. *Warwick-Edinburgh Mental Well-being Scale (WEMWBS; Tennant et al, 2007)*
(See Appendix 3)

Key reasons for the selection of these survey included:

- The DASS provides insight into depression stress and anxiety, whilst the WEMWBS provides complementary insights into wellbeing. Together, they will provide insight into the key goals of the PLAY project, namely student anxiety, stress and mental health and wellbeing. Thus, they allow students to monitor and to gain awareness of their own levels of stress, anxiety and mental distress (negative states), whilst also assessing and understanding their mental wellbeing (positive states). The data will also provide an important source of information to college authorities and help them to identify priority areas for student support.
- Both measures have excellent psychometric properties. They are widely considered to be reliable and valid and have been previously used and well-tested across Europe and in adolescents, young adults and university students.
- Results from the surveys can be measured against standardised norms, which allows for easy and accurate interpretation of survey scores – thereby, providing clear insight into the mental health and wellbeing of players/university students.
- Both surveys are brief and easy to complete and can be translated easily into multiple languages.
- Data generated from the surveys can be collected anonymously without generating significant ethical concerns or violations.

Overall, the two surveys combined will provide important insights into player / student mental health. The combination of measures will allow participants to build up a holistic picture and awareness of their own difficulties, particularly in relation to their stress, anxiety and mental distress, as well as their wellbeing and mental health. It is also important to note that the next stage of the PLAY programme of work will involve a piloting process. During this

process we will be able to test out the benefits of survey implementation with the 3D virtual world from the users and university perspective, as well as troubleshoot any potential challenges and/or difficulties in the surveys.

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Appendix 1 - The PLAY suite of Scenarios

The scenarios within the PLAY 3D virtual world are listed below:

Sequence	Scenario	Aims/Skills gained
Scenario 0	Learning the 3D virtual world environment	<ul style="list-style-type: none"> • Players learn how to use the 3D virtual environment
Scenario 1	Facing an exam	<ul style="list-style-type: none"> • Identifying the physiological symptoms of anxiety • Gaining relaxation skills to tackle symptoms of anxiety (e.g. Breathing techniques)
Scenario 2	Dealing with a bad result	<ul style="list-style-type: none"> • Identifying cognitive distortion • Learning positive thought reframing skills to overcome cognitive distortions
Scenario 3	Mature students / Distance learning	<ul style="list-style-type: none"> • Dealing with poor progress on studies due to lack of time and insufficient background • Deciding calmly whether to drop out or continue studies
Scenario 4	Dealing with a difficult assignment	<ul style="list-style-type: none"> • Dealing with the pressure of academic achievement • Developing motivation, self-confidence, self-esteem, optimism and self-regulation
Scenario 5	Dealing with group assignments	<ul style="list-style-type: none"> • Identifying negative behaviours and social fears • Developing positive social skills
Scenario 6	Socialising – Getting to know others	<ul style="list-style-type: none"> • Identifying social fears • Developing positive social skills
Scenario 7	Adapting to university life	<ul style="list-style-type: none"> • Identifying social fears • Developing positive social skills
Scenario 8	Talking to lecturers / seeking support	<ul style="list-style-type: none"> • Identifying fears / negative thought processes • Developing skills to overcome negative thoughts
Scenario 9	Life after university	<ul style="list-style-type: none"> • Identify fears / negative thought related to work after college • Developing positive work-related attitude

Appendix 2 – The Depression, Anxiety and Stress Scale

DASS21		Name:	Date:		
Please read each statement and circle a number 0, 1, 2 or 3 which indicates how much the statement applied to you over the past week . There are no right or wrong answers. Do not spend too much time on any statement.					
The rating scale is as follows:					
0	Did not apply to me at all				
1	Applied to me to some degree, or some of the time				
2	Applied to me to a considerable degree or a good part of time				
3	Applied to me very much or most of the time				
1 (s)	I found it hard to wind down	0	1	2	3
2 (a)	I was aware of dryness of my mouth	0	1	2	3
3 (d)	I couldn't seem to experience any positive feeling at all	0	1	2	3
4 (a)	I experienced breathing difficulty (e.g. excessively rapid breathing, breathlessness in the absence of physical exertion)	0	1	2	3
5 (d)	I found it difficult to work up the initiative to do things	0	1	2	3
6 (s)	I tended to over-react to situations	0	1	2	3
7 (a)	I experienced trembling (e.g. in the hands)	0	1	2	3
8 (s)	I felt that I was using a lot of nervous energy	0	1	2	3
9 (a)	I was worried about situations in which I might panic and make a fool of myself	0	1	2	3
10 (d)	I felt that I had nothing to look forward to	0	1	2	3
11 (s)	I found myself getting agitated	0	1	2	3
12 (s)	I found it difficult to relax	0	1	2	3
13 (d)	I felt down-hearted and blue	0	1	2	3
14 (s)	I was intolerant of anything that kept me from getting on with what I was doing	0	1	2	3
15 (a)	I felt I was close to panic	0	1	2	3
16 (d)	I was unable to become enthusiastic about anything	0	1	2	3
17 (d)	I felt I wasn't worth much as a person	0	1	2	3
18 (s)	I felt that I was rather touchy	0	1	2	3
19 (a)	I was aware of the action of my heart in the absence of physical exertion (e.g. sense of heart rate increase, heart missing a beat)	0	1	2	3
20 (a)	I felt scared without any good reason	0	1	2	3
21 (d)	I felt that life was meaningless	0	1	2	3

Appendix 3 – Warwick Edinburgh Mental Wellbeing Scale

The Warwick–Edinburgh Mental Well-being Scale (WEMWBS)

Below are some statements about feelings and thoughts.

Please tick the box that best describes your experience of each over the last 2 weeks

STATEMENTS	None of the time	Rarely	Some of the time	Often	All of the time
I've been feeling optimistic about the future	1	2	3	4	5
I've been feeling useful	1	2	3	4	5
I've been feeling relaxed	1	2	3	4	5
I've been feeling interested in other people	1	2	3	4	5
I've had energy to spare	1	2	3	4	5
I've been dealing with problems well	1	2	3	4	5
I've been thinking clearly	1	2	3	4	5
I've been feeling good about myself	1	2	3	4	5
I've been feeling close to other people	1	2	3	4	5
I've been feeling confident	1	2	3	4	5
I've been able to make up my own mind about things	1	2	3	4	5
I've been feeling loved	1	2	3	4	5
I've been interested in new things	1	2	3	4	5
I've been feeling cheerful	1	2	3	4	5

Warwick–Edinburgh Mental Well-being Scale (WEMWBS)
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