Factors associated with interest in using genetic testing to identify predisposition for psychological and physical health conditions

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Statement of Sources

I declare that this report is my own original work and that contributions of others have been duly acknowledged.

Estelle Duggan

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Abstract

This study examines willingness to engage in genetic testing for predisposition of psychological disorders in contrast to physical health conditions. Further considered is interest genetic testing between conditions of proximal and distal onset. The Theory of Planned Behaviour was employed to investigate whether attitudes, subjective norms and perceived behavioural control were associated with the level of interest towards testing for physical and psychological conditions. A total of 178 participants aged 18 years and above (mean age = 32.6 years; female $N = 149$, male $N = 25$, other $N = 4$) completed an online survey of their attitudes towards health and genetic testing and indicated their level of interest in having a genetic test to identify predisposition to physical and psychological health conditions. Participants expressed greater interest towards testing for physical compared to psychological conditions. Greater interest in testing was also revealed for distal conditions compared to those with a typically earlier onset. Results from regression analyses provided partial support for the Theory of Planned Behaviour in accounting for interest in genetic testing for physical and psychological disorders, with attitudes towards genetic testing the greatest predictive factor in willingness towards genetic testing across all outcome measures.

Keywords: Genetic testing, genetic risk, psychological disorders, precision medicine, Theory of Planned Behaviour

Genetic testing is becoming available for an increasing number of health conditions, and public accessibility to these tests is increasing as well (Wade et al., 2012). Genetic testing identifies how likely a person is to develop a heritable health condition based on information derived from genetic variations picked up in the individual's blood or saliva (Sherman & Cameron, 2015). Genetic testing is becoming cheaper (Driver et al., 2020), and tests results can now be issued direct-to-consumer via internet-based companies (Roberts et al., 2017).

The primary motivator for obtaining genetic information is to gain personalised insight into an individual's genetic predisposition for developing health concerns, in order to prevent and treat any disorders that are identified as higher risk (Driver et al., 2020). Advancements in precision medicine (the pursuit of personalised prevention and treatment measures derived from individual genetic information), together with increased public availability of genetic testing has expanded the types of conditions people are able to be, and are interested in being tested for (Driver, 2020).

Decisions to engage in genetic testing are multifaceted and depend on a combination of personal and disorder based factors (Sherman & Cameron, 2015). Personal factors such as the presence of a personal or family history are conducive to interest in genetic testing (Meiser et al., 2020), and interest in genetic testing is also associated with individual beliefs around personal levels of risk, and individual perceptions of how serious or manageable a condition is (Oliveri et al., 2020). Characteristics associated with specific health conditions further contribute to interest in uptake of genetic testing. Disorder based factors include the extent to which a condition is penetrant (the likelihood that the carrier of a genetic condition will develop associated symptoms) (Kiln et al., 2014), how reliably a condition can be predicted, and how responsive the condition is to intervention (Meiser et al., 2020).

To date there has been no investigation into the specific factors that contribute to uptake in genetic testing between health conditions of a physical or psychological nature.

Sherman et al. (2015) conducted a study comparing interest in obtaining a genetic test for type-two diabetes and Alzheimer's disease. Findings indicated that perceptions of the severity, preventability and treatability of these conditions contributed to interest in genetic testing, with participants expressing higher interest for type-two diabetes over Alzheimer's disease due to these factors. It was noted that Alzheimer's disease carried an additional burden from stigma associated with the severity and unrelenting nature of the condition. While the study did not consider the typical age of onset of these disorders, it provides insight into how perceptions and beliefs around disease-based factors impact on interest in using genetic testing to identify predisposition for different health conditions. Examples of disease-based factors include how fixed, or person centred a condition is believed to be, as well as the degree of associated stigma.

Psychological conditions are progressively being associated with genetic origins (Lebowitz & Ahn, 2018), and most psychological disorders are polygenic, often comprising small contributions from many genes (Murray et al., 2020). Advancements in psychological genetics have progressed slowly in comparison to physical genetics due to the more complex nature of psychological conditions, and the interplay of genetic and environmental contributors (Roberts & Kim, 2017). In recent years, demand for direct-to-consumer genetic testing for psychological health conditions has increased. This reflects advancements in the capability of modern tests to provide information for more genetically complex conditions, as well as an expanding drive to apply precision medicine practices to psychological conditions such as depression and schizophrenia (Driver, 2020). While concerns regarding misinterpretation of results and prognostic pessimism (the belief that a condition cannot be rehabilitated) have been associated with genetic testing (Lebowitz & Ahn, 2018), the majority of those that engage in genetic testing do so without harm or regret, and in some

cases, individuals can welcome a positive impact to their health following lifestyle modifications made in response to individual test results (Roberts et al., 2017).

Behaviour can be adapted in response to genetic test results (Horne et al., 2018), and in addition to mitigating risk, genetic information can be incorporated into decision making for optimised health outcomes and improved quality of life (Wessel et al., 2016). This is achieved through personalisation of treatment and intervention strategies (Wessel et al., 2016), as well as in maintaining wellbeing where interventions are ineffective or unavailable (Oliveri et al., 2018). Individualised genetic information can also provide a sense of control, by reducing uncertainty of the future (Sherman et al., 2015). For example, Roberts et al. (2017) found that in the case of Alzheimer's disease, where prevention and treatment options are limited, personalised genetic information provides motivation for taking out suitable insurance for future health care. While receiving personalised genetic test results may provide a foundation of knowledge from which optimal lifestyle choices can be prescribed, actual behavioural change depends on many factors, including the perceived ability to execute appropriate lifestyle changes (Horne et al., 2017).

Attitudes towards psychological health conditions versus physical health conditions

Mental health disorders add a dimension of adversity beyond that which occurs with physical health conditions, in that they can introduce increased social discrimination and stigma (Oliveri et al., 2018). Stigma and lack of understanding are the two most common barriers to seeking help for psychological conditions, and often people do not know what treatments are available, or what is involved with treating psychological illness (Choudhry et al., 2016). As well as impacting views of others, stigma also influences internal views of the self (Haslam, 2011). Stigma associated with psychological health conditions affects self-worth, which can compromise quality of life, motivation, and achievement (Corrigan & Rao, 2012). Stigma further impacts on seeking help for psychological concerns (Haslam, 2011).

A health condition carries more stigma when a person is considered to be responsible for its development, as well as when a condition is believed to be fixed (Choe et al., 2020). Psychological illnesses are often wrongfully attributed to the person themselves, and as well as being seen as culpable for their hardship, those with psychological health conditions can be perceived as unresponsive to treatment, and less likely to recover (Choe et al., 2020). This explains why there may often be more compassion and support offered to those with physical health conditions, which are largely perceived to be imposed on a person, and more treatable than psychological disorders (Choe et al., 2020).

Psychological disorders are more greatly associated with identity than physical conditions are (Roberts & Kim, 2017). Views that those with psychological disorders are unstable, unpredictable and have lost a degree of agency over their actions (Dar-Nimrod & Heine, 2011), as well as beliefs that psychological disorders are unresponsive to treatment, perpetuate stigma and introduce discomfort and consequent social distancing (Choe et al., 2020). Penetrance, a high predictor of interest in genetic testing, is lower for psychological conditions than disorders of a physical nature. This is explained by a more complex polygenic composition associated with psychological disorders, in comparison to many physical conditions, where for example a single gene may be responsible for its development (Meiser et al., 2020). Considering the differences in perceptions of, and attitudes towards, physical and psychological health concerns, it would be reasonable to expect disparity in interest in genetic testing for predispositions between these types of disorders.

Mental Health, and Health and Genetic Literacy

Improved health literacy predominantly leads to improved health (Furnham & Swami, 2020), however mental health literacy is lacking throughout society (Saha et al., 2017). Physical health conditions are generally better understood in comparison to psychological conditions, and communication and interpretation of health information for physical

conditions are more effective and successful than with psychological conditions (Furnham & Swami, 2020). Media contributes to perceptions of dangerousness and instability, and knowledge of mental health issues can consist of negative stereotypes, which maintains adversity for those with psychological health conditions (Koike et al., 2015). As an example of the contribution of negative attitudes towards perceptions of psychological disorders, in Japan in 2002, schizophrenia was renamed, resulting in a reduction in stigma and negative public perception of the condition (Koike et al., 2015).

It is estimated that up to 50% of people will develop a psychological condition throughout their lifetime (Furnham & Swami, 2020). Awareness of psychological health conditions is typically widespread throughout society (Saha et al., 2017), however conditions of a psychological nature are often grouped and discussed as a collective rather than considered as separate conditions (Koike et al., 2015). Public knowledge and societal attitudes are commonly based on misunderstanding or misinterpretation, often without true understanding of the essence or complexities associated with conditions of a psychological nature (Saha et al., 2017).

While early treatment and intervention is preferable for psychological disorders, stigma and limited mental health literacy can prevent help seeking (Furnham & Swami, 2020). As an example of this, a common societal view of depression is that the condition is attributed to a lack of stoicism, and that the disorder arises as a result of cultivation or situational factors, or in contrast, has a biological cause which is predetermined and unchangeable (Furnham & Swami, 2020). In response to this, the perceived efficacy of professional treatment is discounted, and those with depression may not seek professional treatment as willingly as would occur for physical health concerns, with preference instead going to social connections and self-help alternatives in place of professional options (Furnham & Swami, 2020). It is plausible that individuals may therefore prefer not to engage

with genetic testing for psychological conditions where these are not considered medical concerns, and subsequently the efficacy of testing is minimised. Given the increasing use and capability of genetic tests in health management, a lack of willingness to engage in testing for psychological conditions would have important implications in optimal management of these disorders.

In exploring the factors that are associated with uptake in genetic testing for health conditions, it is important to note that the higher someone's genetic literacy, the more likely they will be to engage in genetic testing and go on to use their personalised genetic information when making decisions about their health (Chapman et al., 2019). Health and genetic literacy are necessary because it helps with educated decision making, and the ability to understand the individual risk determined by genetic test results (Chapman et al., 2019). Genetic literacy in the general population is quite poor, even for those in health professions. Heritability is often over and underestimated depending on how much control an individual is perceived to have over their life, a particular trait or condition (Chapman et al., 2019). Media reporting on genetics are often provided out of context or without enough detail, and heritability and genetic influence can be largely overstated as a result (Dar-Nimrod & Heine, 2011).

Community perceptions of mental health conditions can be quite cynical, especially when associated with a biological basis, and an essentialist view can result, where conditions are perceived as more severe, fixed and less treatable that they are in reality (Haslam, 2011). Attitudes towards genetic testing are also likely to be influenced by genetic literacy; for many lay people with limited literacy around genetic knowledge, test results can be perceived emotionally, and interpreted with more of an essentialist view, and more immutable than they really are (Haslam, 2011). Subsequently, personal, and environmental contributors to the development of a disorder are disregarded (Dar-Nimrod & Heine, 2011). Beliefs around the

perceived cause of a psychological condition, genetic or otherwise, contribute to the pursuit of treatment, and perceived cause also influences the type of treatment that is sought (Choudhry et al., 2016). It would therefore make sense for the impact of essentialist beliefs to extend to willingness in engaging in genetic testing for conditions of a psychological nature.

Literature in this area is still developing and prior studies vary in their findings. Nolan and O'Connor (2019) found that attribution of depression to a biological cause can deter the belief that lifestyle factors can lower risk. Stolzenburg et al. (2018) however, found that the ability to associate psychological illness with a biomedical cause can mean that people are more inclined to seek and benefit from help. These researchers also found that where a psychological disorder is attributed to a more person-centred cause, a reduced need for help can be perceived, potentially explained by the view that the disorder developed as a result of personal shortcomings, rather than a condition to be professionally managed (Stolzenburg et al., 2018). Despite this, the majority of studies have found that attributing psychological health concerns to a genetic basis is positive (Meiser et al., 2020) and a biological basis may help to establish psychological disorders as medical conditions, relieving some of the stigma associated with conditions of a psychological nature (Meiser et al., 2020).

Haslam and Kvaale (2015) present a "mixed-blessings model" relating to the contrasting views associated with genetic explanations of psychological disorders. This model explains that genetic origins of psychological conditions can be beneficial, in that blame is reduced when a disorder is attributed to a predetermined biological cause, but that a genetic explanation of psychological concerns also influence views of genetic essentialism, which can lead to social distancing, prognostic pessimism, and perceptions that those with psychological conditions are unstable.

Onset of Disorder – Is Testing for Late Onset Disorders Influenced by Delay Discounting?

Delay discounting is a decision making concept, where the value of a reward is perceived to be disproportionately greater when immediately available, and the value of the reward declines as the delay in receiving it increases (da Matta et al., 2012). This tendency to prefer an immediate reward, and devaluation of a delayed alternative, exists even when the delayed alternative is of greater value, and is linked to the perceived availability of the possible alternatives. A benefit is perceived to be much more available if it is received in the short term, than if it were to be received at a more removed time in the future (O'Donnell et al., 2017).

The inclination to prefer present benefits over those received in the future can prevent engagement in health promoting behaviour where immediate effort leads to a beneficial, but delayed health outcome (Bradford, 2010). Evidence in the realm of delay discounting has indicated that people are less likely to practice preventative health behaviours (Epstein et al., 2020) and engage in screening for conditions that occur later in life, such as mammograms, pap smears, and dental examinations (Bradford, 2010).

Where a particular circumstance can be envisioned at a point in the future, the effect of delay discounting is reduced, and events that occur later in life would be more removed and irrelevant (O'Donnell et al., 2017). Although personalised genetic knowledge provides insight into individual risk, and therefore presents a subsequent opportunity for lifestyle and behavioural change, it may be less enticing to test for conditions with a more distal onset, because the risk is further removed from the present, and people may be more likely to engage in genetic testing for conditions that are typically known as having a more immediate onset. To our knowledge, no research has been conducted to compare this. It is plausible that discounting will be apparent in regards to uptake for genetic testing for distal conditions,

where individuals find it harder to identify and imagine themselves with a disorder that develops in later life, compared to a condition of more proximal onset.

Theory of Planned Behaviour

The Theory of Planned Behaviour (TPB) has been widely used to explain health behaviour, and specifies intention as the strongest predictor of behaviour. The TPB has been tested and validated by an extensive number of studies examining the predictors of health behaviour and is a robust theory of predicting behaviour and behaviour change associated with health choices (Wolff et al., 2011). The TPB places intention as the main driver of behaviour and presents three independent factors which contribute to intent; attitudes, subjective norms, and perceived behavioural control (Wolff et al., 2011). In application to the current study, it is suggested through the lens of the TPB that the intention to undertake genetic testing will be influenced by the attitudes an individual holds about genetic testing for particular conditions, perceived normative beliefs and the motivation to comply with the expectations of important others, and perceived self-efficacy in managing health behaviours and outcomes (Cook & Wood, 2019).

An important rationale for the use of the TPB over other models in the current study, is its focus on intention as the predecessor for behaviour. While prior behaviour has a strong association in predicting future action (McEachan et al., 2011), genetic testing would not be considered an enduring or ongoing set of actions, but often a single decision or event. Prior testing therefore may not have been relevant or available, or not related to future decisions to be tested, and was not a focus of this study. Further, behaviour is not always consistent with intellectual reasoning, or moral beliefs (Cook & Wood, 2019), and a gap can exist between intention and behaviour (Hardie, 2011). An example of this is that people may perceive exercise favourably, and understand that engaging in regular exercise contributes to improved health outcomes, and yet despite this still not participate in exercise. In the context of the

current study, the focus on intention in predicting uptake in genetic testing for predisposition to physical and psychological disorders was well suited.

To date the TPB has had limited inclusion within the scientific literature of studies examining genetic testing decisions. In 2014, Kiln et al. (2014) explored disorder-based factors which impact on intention to undertake genetic testing. Findings included the extent to which a condition is penetrant, the level of certainty with which a condition can be predicted, how treatable the disorder is, as well as the importance of attitude towards genetic testing to testing decisions. While this provided a valuable contribution towards our understanding of some of the factors contributing to interest in genetic testing, this was exploratory and lacked an established theoretical foundation.

Wolff et al. (2011) conducted a study using an extended version of the TPB to determine interest in genetic testing for health predispositions generally, finding that over half of their sample would be interested in obtaining a genetic test for an incurable disease. This research applied the construct of perceived behavioural control in terms of perceived control over the actual practice of having a genetic test. This study was completed ten years ago and while attitudes towards genetic testing were an indicator of genetic testing interest, subjective norms were not. The researchers believed that this was likely due to the emerging nature and availability of genetic testing at that time and suggested that ideas of subjective norms may not have been well formed on the topic. Given the rapid advances in this area, and greater public awareness, it is likely that community awareness and beliefs have changed.

A recent study by Zimmermann et al. (2021) investigated the influence of social acceptance on genetic testing decisions for a number of cancer and cancer related disorders. Within their sample, genetic testing uptake was influenced by the degree of social acceptance and views of important social contacts. These researchers explain that the influence of social views was particularly applicable to blood relatives because genetic test results can be

indicative of familial risk as well as personal risk of a predisposition to developing a heritable illness. It would be reasonable to expect that when considering testing for genetic predispositions, individuals would be influenced by the subjective norms of those closest to them.

Wade et al. (2012) tested a number of constructs on their influence on uptake in genetic testing and found attitudes towards genetic testing to be the strongest predictor of genetic testing decisions. While psychological health conditions were not included in the study, these researchers advocate that the components of the TPB are sound predictors of the intention to undertake genetic testing for a number of physical health conditions and recommend that future studies in the area be modelled on the foundation of this theory. In concurrence, Horne et al. (2018) state that due to the emerging nature of this field of research and a lack of foundational theory from which interest in genetic testing can be reliably predicted, incorporating the TPB into study design is recommended in order to reduce confounding factors and diversity in results between studies.

Rationale, Aim & Hypotheses

To date, there has been no research comparing an individual's interest in genetic testing for psychological health conditions, in comparison to physical health conditions, or between conditions of proximal and distal onset. In a systematic review of the accumulated knowledge in this field, Sweeny et al. (2014) describes the body of literature as inconsistent, with a high level of variability in the results between studies looking at predictors of interest in genetic testing for certain disorders. These researchers present an argument that clarity needs to be reached around the personal and disorder based factors that contribute to testing choices, and the need for established theories and measures to be incorporated into research design to improve consistency and validity.

It is plausible that attitudes towards testing for psychological and physical conditions will differ. Psychological health conditions are viewed with more pessimism and are perceived as less responsive to treatment and personal or environmental change, especially when attributed to a biological or genetic cause (Haslam, 2011). This misinterpretation of genetic information could potentially influence intentions towards testing for psychological health conditions, with a more straightforward and logical approach expected for testing for predispositions to physical health conditions (Wohlke, et al., 2019). Similarly, interest in genetic testing is likely to differ between proximal and distal conditions, where benefits of testing would be more or less immediately relevant depending on the age of onset of a particular disorder.

This study intends to examine the above research questions, and through the lens of the TPB will consider how attitudes, subjective norms, and perceived behavioural control, contribute to interest in genetic testing for physical and psychological health conditions. The following hypotheses are presented:

1. Participants will demonstrate increased interest in genetic testing for physical health conditions over psychological health conditions.

Of further consideration is whether interest in genetic testing differs between health conditions of proximal and distal onset. We know that people are less likely to engage in preventative health measures and health screening for conditions that develop later in life (Epstein et al., 2020), and in line with evidence in the realm of delay discounting, it is expected that interest in genetic testing will be higher for health conditions that are more immediately relevant, comparative to those that would develop in later life. Based on this evidence, the following is predicted:

2. Participants will demonstrate decreased interest in testing for health conditions (both physical and psychological) with an onset in later life than those considered to have a proximal onset.

Furthermore, this study will use the TPB as a foundation to examine whether attitudes, subjective norms and perceived behavioural control, will differ between physical and psychological health conditions, and how these factors will influence interest in using genetic testing to identify predisposition for physical and psychological health conditions. It is well understood that the increased stigma associated with psychological disorders impacts on societal attitudes towards those with the conditions and the conditions themselves, presenting a barrier for seeking medical treatment (Haslam, 2011). We expect this demonstrated influence on the perceptions of psychological health conditions, as well as genetic essentialism and limited literacy in both genetics and mental health, to translate to differences in attitudes and subjective norms towards engaging in genetic testing between physical and psychological conditions. The following is therefore predicted:

3. Attitudes to genetic testing, subjective norms, internal locus of control and perceptions of self-efficacy in relation to health, will be associated with greater interest in genetic testing for physical conditions, but not for psychological health conditions.

Method

Participants

A total of 178 participants were included in the study (male *n* =25, female *n* = 149, other *n* = 4). Participants were required to be aged over 18 years (mean age =32.5, *SD* = 12.6 years). The sample was predominantly Caucasian, comprising 88% of respondents, 4% of participants were Asian, 2% were First Nations people, and 5% of respondents identified with other cultural backgrounds. Eighteen percent of participants indicated having had a genetic

test previously. Table 1 provides details of those who identified as having been diagnosed with one of the five health conditions of interest to this study, as well as those that reported having a close family member who had been diagnosed with one of the relevant conditions (i.e., depression, type-two diabetes, schizophrenia, Alzheimer's disease, or heart disease).

Table 1
*Personal and Family History of Relevant Health Conditions (*N = *178)*

Person diagnosed	Self		Close relative	
	n	%	*n*	%
Depression	70	39.3	105	59.0
Schizophrenia	0	0.0	15	8.4
Diabetes	1	0.6	66	37.1
Heart disease	1	0.6	46	26.0
Alzheimer's disease	1	0.6	22	12.4

Procedure

Ethics approval was obtained (approval number: H0016623; Appendix A). Participants were recruited with advertisements posted online to social media, presentation to first year psychology students at the University of Tasmania via SONA, and fliers posted around the Sandy Bay campus targeting the greater university community. Participants completed an online questionnaire via LimeSurvey. An information sheet was provided presenting the aims of the study, and informed consent was obtained prior to receiving access to the survey (Appendix B).

Materials

Demographic information. Demographic information was collected to determine gender, age, and cultural background.

Previous medical history. Participants were asked to respond to six items relating to their medical and genetic testing history. (e.g., whether they had previously had a genetic test; if they had previously had a direct-to-consumer genetic test; and whether they had a medical practitioner that they see regularly). A sliding scale was then provided for

participants to indicate how much trust they place on a medical practitioner to provide sound medical advice, on a scale of 1-10. Participants were asked whether they or a close family member had ever been diagnosed with any of the five health conditions of interest to the study.

Willingness to engage in genetic testing for physical and psychological conditions. Participant willingness to engage in genetic testing was measured using a visual analogue sliding scale (0-100), with higher scores indicating higher interest in obtaining a genetic test for several specific health conditions; depression, schizophrenia, Alzheimer's disease, type 2 diabetes and heart disease. These conditions were selected for four reasons. Each has a genetic basis and are well known throughout the general population. There is evidence to clearly delineate between these disorders having an early or later life onset and there is a clear distinction whether these conditions are physical or psychological in nature, with the exception of Alzheimer's disease, however this was included as we were particularly interested in later life disorders.

Schizophrenia typically develops in early adulthood, (Musket et al., 2020) and the disorder has considerable heritability of around 80% (Hilker et al., 2017). Depression also arises most often in early or mid-adulthood (Fernandez-Pujals et al., 2015). Heritability of depression is currently understood to be around 30-40% (Ripke et al., 2012). Type-two diabetes is most often diagnosed in mid-adulthood and has an expected age of onset from 35 years. The heritability for type-two diabetes varies across the world due to differences in the impact of both environmental and genetic influences and is estimated to be anywhere from 25-80% (Bullard et al., 2018). Alzheimer's disease and heart disease are both widely considered to be diseases that occur in later life (Oliynyk, 2019). Alzheimer's disease is largely heritable and has many genetic risk factors with little known environmental influence

(Jack et al., 2019). With more contribution from the environment, heart disease is still substantially heritable (Jansweijer et al., 2019).

Attitudes towards genetic testing. Attitudes towards genetic testing were measured on a five-point Likert-scale (1 = *strongly disagree*; 5 = *strongly agree*) for each of the selected disorders. Examples of questions include: "*If a genetic test showed that my genetic make-up put me at greater risk of developing depression, I would be pleased that I had advance knowledge of the increased risk.*" and "*If a genetic test showed that my genetic make-up put me at greater risk of developing depression, I would regret having the test*" (full scales provided in Appendix C). Attitudes for each of the disorders were combined to give a view of attitudes towards genetic testing generally, rather than at a disorder level.

Subjective norms. The construct of subjective norms was measured with a series of six questions which were developed for the study, as there were no published scales designed to measure the concept of subjective norms (items detailed in Appendix D). Questions referred to participants' understanding of how those considered most significant to them view both genetic testing, and the participant's hypothetical intention towards obtaining a genetic test. Examples of items include: "*The people most important to me (e.g., close family or friends) would probably think it would be good idea to take a genetic test*" and *"If I were to decide to get a genetic test, I think the people most important to me would support me."* Participants responded on a five-point Likert-scale (1 = *strongly disagree*; 5 = *strongly agree*).

Perceived Health Competence Scale (PHCS; Smith et al., 1995). The PHCS is an eight-item scale measuring the degree to which participants rate their capability in managing their own health, responding to statements on a five-point Likert-scale (1 = *strongly disagree*; 3 = *neither agree nor disagree*; 5 = *strongly agree*). The PHCS was used as a measure of

perceived behavioural control, and measures self-efficacy in managing health outcomes, and perceived capabilities for health behaviour.

Multidimensional Health Locus of Control Scale (MHLCS: Ross et al., 2015). The MHLCS consists of two forms, and Form A was employed in the current study to assess general beliefs about health and provide an additional measure of perceived behavioural control. Two subscales were used, Internal and Chance. Each subscale comprised six questions to which participants responded to statements on a on a six-point Likert-scale (1=*strongly disagree*; 6 = *strongly agree*), assessing their inclination to believe health outcomes are determined by internal actions and attributions, or by external factors and chance, to give an insight into a more internal or external health locus of control.

International Genetic Literacy and Attitudes Survey (iGLAS; Chapman et al., 2017). The iGLAS was developed to assesses public genetic knowledge, attitudes and opinions towards genetic testing (Chapman et al., 2017). From General Knowledge Section One, participants responded to eleven questions indicating their understanding of the heritability of individual traits with a sliding scale of 0-100, from which a measurement of participants beliefs of genetic determinism could be inferred.

Design and Data Analysis

The present study employed a within subjects cross sectional design. All analyses were conducted using Jamovi version 2.0.0. Paired samples t-tests were conducted to test hypothesis 1 (comparing willingness to engage in genetic testing by test type; physical vs psychological) and hypothesis 2 (comparing willingness to engage in genetic testing by typical onset age; proximal vs distal). To test hypothesis 3, hierarchical multiple regression analyses were undertaken, with scores in the attitudes questionnaire, the subjective norms questionnaire, the iGLAS, PHCS, and MHLCS used as predictor variables. Outcome variables were assessed using scores on the sliding scale indicating willingness to engage in

genetic testing for each of the physical and psychological groups of disorders. Correlations were interpreted following recommendations provided by Cohen (1988). For the regression, power analysis using G*Power determined that the sample size of 178 was adequate to achieve a medium effect with five predictor variables (.15, power = 0.95) (Faul et al., 2009).

Results

Means and standard deviations of willingness to engage in genetic testing for outcome variables are presented below, with individual disorders detailed in Table 2, and combined condition groups presented in Table 3.

Table 2

Means and standard deviations of genetic testing interest by group

Health condition	Mean	*SD*
Depression	60.8	33.8
Schizophrenia	61.2	35.6
Diabetes	71.9	33.3
Heart disease	73.7	32.6
Alzheimer's disease	70.0	34.6

Table 3

Means and standard deviations of genetic testing interest by disorder

Condition group	Mean	*SD*
Mental	61.0	31.1
Physical	72.8	30.3
Proximal	64.6	29.0
Distal	71.9	30.9

A repeated measures analysis of variance (ANOVA) found there is a statistically significant difference in willingness to engage in genetic testing, depending on which disorder is considered F (4, N = 178) = 14.1, p <.001 with a small effect (n^2 = .025). Post hoc tests determined no significant difference in willingness to pursue genetic testing between the psychological conditions; depression and schizophrenia, or between the physical conditions; type-2 diabetes and heart disease. Mean interest in being tested for each of the psychological

conditions was significantly lower than interest in testing for testing for each of the physical conditions as well as Alzheimer's disease. Figure 1 demonstrates the significant differences between conditions compared with testing for depression, and Figure 2 presents the significant differences in testing interest between conditions in comparison to schizophrenia.

Figure 1

Significant Differences in Level of Interest in Genetic Testing Interest Between Depression and Other Conditions

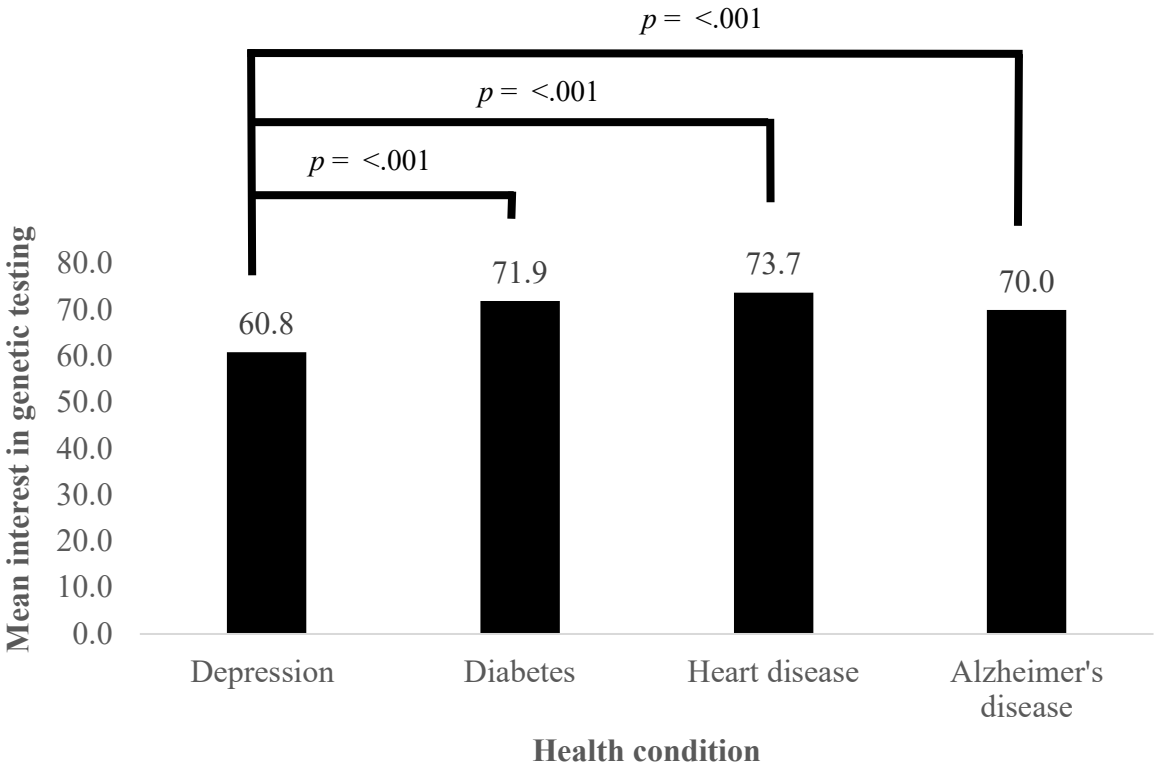
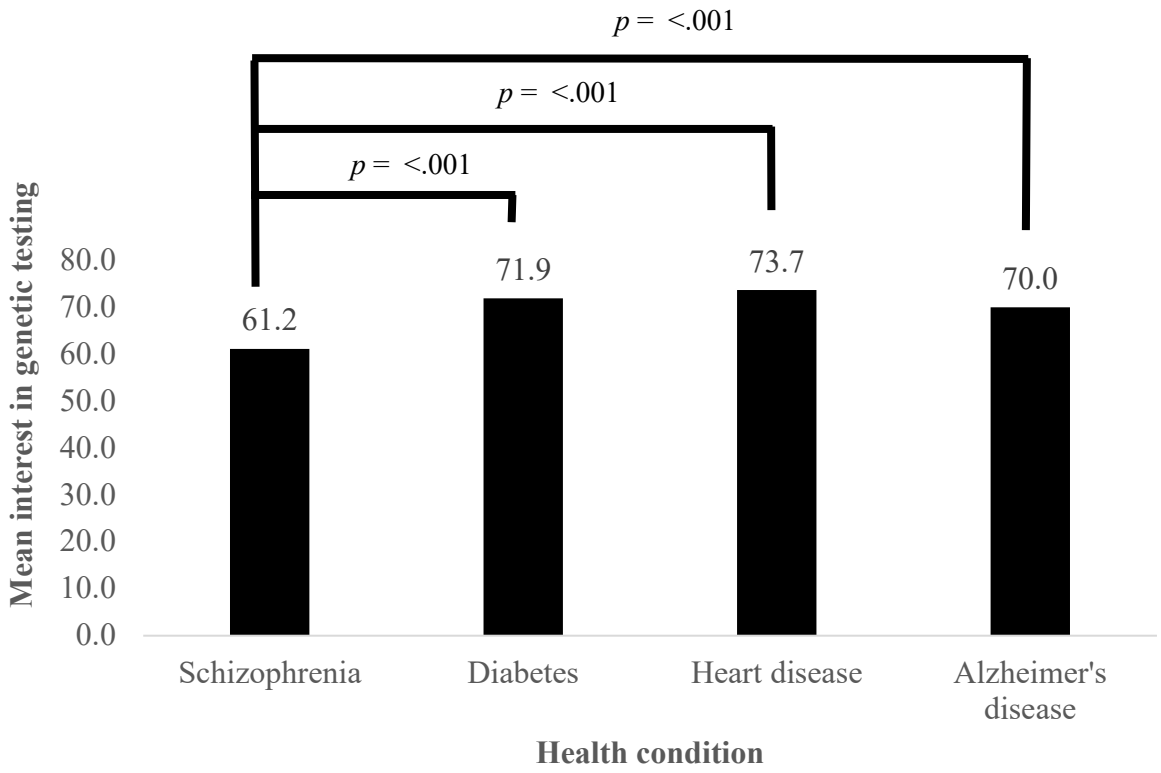


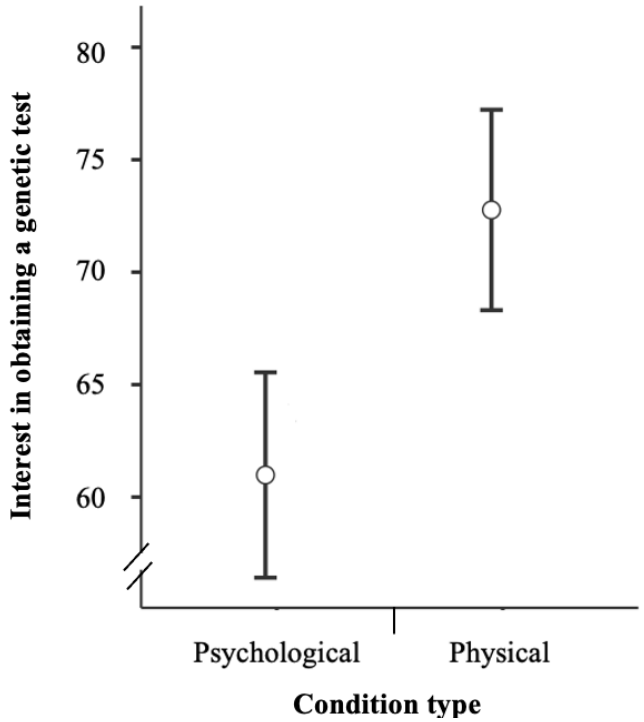
Figure 2
Significant Differences in Level of Interest in Genetic Testing Between Schizophrenia and Other Conditions



A paired samples t-test was performed to compare willingness to engage in genetic testing for physical and psychological health conditions. Results are presented in Figure 3. Consistent with hypothesis 1, participants demonstrated significantly higher interest in genetic testing for physical health conditions (M = 72.8, SD = 30.3) compared with psychological health conditions (M = 61.0, SD = 31.1); t (177) = -6.39, p = <.001; 95% CI [-15.4, -8.15]; with a small to moderate effect; d = 0.479.

Figure 3

Mean (95%CI) Willingness to Engage in Genetic Testing for Psychological and Physical Conditions

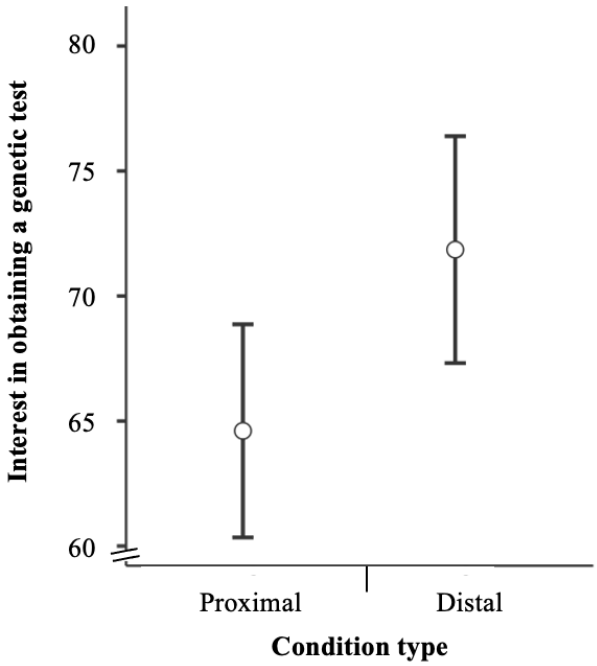


Note. Willingness to engage in genetic testing was measured on sliding scale from 0-100, with higher scores indicating higher interest in testing to determine greater genetic risk of developing each health condition.

An additional paired samples t-test was conducted to compare interest in genetic testing for proximal and distal health conditions, as shown in Figure 4. Contrary to the prediction in hypothesis 2, significantly higher interest in testing for distal health conditions was revealed (M = 71.9, SD = 30.9) compared to proximal conditions (M = 64.6, SD = 29.0); t (177) = -4.55, p = <.001; 95% CI = [-10.4, -4.1], with a small effect demonstrated; d = 0. 341.

Figure 4

Mean (95%CI) Willingness to Engage in Genetic Testing for Proximal and Distal Conditions



Note. Willingness to engage in genetic testing was measured on sliding scale from 0-100, with higher scores indicating higher interest in testing to determine greater genetic risk of developing each health condition.

Given that those in later adulthood might view conditions with onset later in life as being more salient and imminent, we also compared interest in testing for proximal and distal conditions stratified by age. To assess whether those of younger and older age groups responded differently to interest in uptake of genetic testing for proximal and distal conditions, the sample was split at 40 years, which is considered to be the onset of middle adulthood (Lachman et al., 2014). With 142 participants, the majority of the sample were aged below 40 years (77%) and 41 were aged 40 years and above (23%). A one-way ANOVA revealed age did not have an effect on interest in genetic testing for distal (F (1,176) = 0.405, p = .527) nor proximal conditions (F (1,176) = 1.172, p = .283).

Hierarchical multiple regression analyses were employed to test hypothesis 3, assessing whether the components of the TPB; attitudes, subjective norms and perceived behavioural control were associated with greater interest in genetic testing for physical conditions, but not psychological health conditions. Relevant assumptions were tested prior to interpretation of results.

No multicollinearity was observed between predictors. All variance inflation factors (VIFs) were below 10 (the highest VIF = 1.25 and all tolerance values were above .2 (the lowest tolerance statistic = .80) (Field, 2017). Independence of errors was confirmed with the Durbin-Watson test returning values between 1 and 3 for both regression analyses (d=1.94 for the physical health regression model; 2.00 for the psychological health regression model) (Field, 2017).

Shapiro-Wilk tests showed that the distribution of residuals was significantly different from a normal distribution for both analyses, physical ($W = 0.92$, $p < .001$) and psychological ($W = 0.97$, $p < .001$), however, with no outliers identified and the size of the sample, the analyses would be considered robust to violation of the assumption of normality (Tabachnick & Fidell, 2007). Residual scatterplots indicated no violation of linearity or homoscedasticity assumptions.

Examination of zero order correlations (see Table 5) affirmed independence of predictor variables. There was a small positive relationship between subjective norms and attitudes towards genetic testing. Self-efficacy in relation to health (as measured by the PHCS) had a small positive relationship with internal locus of control (Internal subscale of the MHLCS), both of which had a small negative relationship with external locus of control (Chance subscale of the MHLCS). These relationships are anticipated as these measures all relate to perceived behavioural control.

Increased age had a small association with higher scores on the PHCS, $r\,(176) = .16$, $p = .029$, and lower scores on the Chance locus of control subscale $r\,(176) = -.219$, $p = .003$, signifying that as people age their beliefs of self-efficacy in managing their health outcomes becomes stronger, while an external locus of control regarding their health is reduced. A small positive relationship was observed between genetic determinism and age, $r\,(176) = .20$, $p = .008$, indicating that increasing age is associated with stronger beliefs in genetic determinism. This was particularly relevant for psychological conditions, where a small positive relationship, $r\,(176) = .15$, $p = .040$, indicated that stronger beliefs in genetic determinism were associated with greater interest in genetic testing for psychological conditions.

Separate regression analyses were conducted for each individual health disorder; depression, schizophrenia, type-2 diabetes, heart disease and Alzheimer's disease. Attitudes were a significant predictor of genetic testing willingness for all conditions, subjective norms a significant predictor of interest in testing for depression only, and the PHCS measure of perceived behavioural control significantly predicted willingness to test for both depression and diabetes. Summaries of these additional analyses have been included in Appendix E.

Table 5

Zero Order Correlations Between All Predictors and Outcomes

	Age		GD		AT		SN		PHC		IL		CL		PSYI		PHYI
Age	—																
Genetic determinism	0.198	**	—														
Attitudes towards genetic testing	-0.013		0.187	*	—												
Subjective norms	-0.023		-0.050		0.345	**	—										
Perceived Health Competence	0.164	*	-0.027		0.123		-0.001		—								
Internal Locus of Control	-0.061		0.077		0.118		0.028		0.337	**	—						
Chance Locus of Control	-0.219	**	-0.056		-0.183	*	-0.040		-0.281	**	-0.227	**	—				
Interest in GT - physical	-0.100		0.154	*	0.562	**	0.284	**	-0.130		-0.027		-0.053		—		
Interest in GT - psychological	-0.024		0.134		0.535	**	0.261	**	-0.008		0.066		-0.055		0.679	***	—

Note. GD = genetic determinism; AT = attitudes towards genetic testing; SN = subjective norms, PHC = perceived health competence; IL = internal locus of control; CL = chance locus of control; PSYI = interest in genetic testing for psychological conditions; PHYI = interest in genetic testing for psychological conditions.

* $p < .05$, ** $p < .01$

Two three step hierarchical multiple regression analyses were conducted, the first with interest in genetic testing for physical health conditions as the outcome variable, and the second with the outcome of interest in genetic testing for psychological health conditions. Regression statistics for interest in genetic testing for physical conditions are reported in Table 5, and psychological conditions in Table 6. When all predictor variables were included in the regression model, the components of the TPB accounted for 28% of the variance in interest in genetic testing for physical conditions and 33% of the variance in interest in testing for psychological conditions.

To control for age and beliefs related to genetic determinism, these variables were entered into step one of the regression analyses. Combined, age and beliefs in genetic determinism accounted for 2% of the variance in interest in testing for physical $R^2 = .02$, $F\ (2,175) = 1.83$, $p = .163$), and 4% of the variance in interest in testing for psychological conditions $R^2 = .04$, $F\ (2,175) = 3.79$, $p = .025$, the latter a significant contribution. Attitudes towards genetic testing and subjective norms were entered at step two and contributed significantly to both models, accounting for an additional 28% of the variance in interest in testing for physical conditions, $\Delta R^2 = .28$, $F\ (2,173) = 33.79$, $p < .001$; and 30% of the variance in interest in testing for psychological conditions, $\Delta R^2 = .30$, $F\ (2,173) = 39.20$, $p < .001$. As can be seen in Tables 5 and 6, attitudes towards genetic testing were the most important predictor, while subjective norms alone were not a significant predictor of the variation in interest in genetic testing.

As three measures of perceived behavioural control were included, scores on the PHCS and the Internal and Chance subscales of the MHLCS were entered into the model together at step three. This addition was not significant in predicting the outcome of interest in genetic testing for physical conditions $\Delta R^2 = .01$, $F\ (3,170) = 0.455$, $p = .716$, but provided a significant additional 3% of variance to the model predicting willingness to engage in genetic

testing for psychological conditions, ΔR^2=.03, F (3,170)=3.06, p = .030. As shown in Table 6, the majority of this variance is explained by the PHCS, with no significant value in predicting the variance in interest of genetic testing, revealed for either of the MHLCS subscales. This result indicates that higher competence and self-efficacy in relation to health predicts greater interest in genetic testing for psychological conditions, but more general beliefs around an internal or external locus of control do not.

Table 5

Hierarchical Regression Results Showing Relationship of Predictor Variables with Interest in Genetic Testing for Physical Health Conditions

Model		*B*	*SE*	Beta	*t*	*p*		95% Confidence Interval for B	
								Lower	Upper
Step 1	Constant	124.466	18.163		6.853	< .001	**	88.621	160.312
	Age	-0.252	0.368	-0.052	-0.684	0.495		-0.979	0.475
	Genetic determinism	0.053	0.028	0.144	1.888	0.061		-0.002	0.107
Step 2	Constant	-132.543	35.890		-3.69	< .001	**	-203.382	-61.705
	Age	-0.122	0.315	-0.025	-0.39	0.698		-0.743	0.499
	Genetic determinism	0.019	0.024	0.051	0.77	0.445		-0.029	0.067
	Attitudes towards genetic testing	2.754	0.389	0.493	7.08	< .001	**	1.985	3.522
	Subjective norms	1.632	1.209	0.093	1.35	0.179		-0.754	4.017
Step 3	Constant	-134.585	48.058		-2.800	0.006	**	-229.452	-39.717
	Age	-0.015	0.332	-0.003	-0.046	0.964		-0.671	0.641
	Genetic determinism	0.015	0.025	0.041	0.607	0.545		-0.034	0.064
	Attitudes towards genetic testing	2.834	0.401	0.508	7.072	< .001	**	2.043	3.625
	Subjective norms	1.550	1.216	0.088	1.274	0.204		-0.851	3.951
	Perceived health competence	-0.675	0.678	-0.071	-0.995	0.321		-2.014	0.664
	Internal locus of control	0.368	0.826	0.031	0.445	0.657		-1.263	1.998
	Chance locus of control	0.336	0.783	0.030	0.430	0.668		-1.208	1.881

Note. * $p < .05$, ** $p < .01$

Table 6

Hierarchical Regression Results Showing Relationship of Predictor Variables with Interest in Genetic Testing for Psychological Health Conditions

Model		*B*	*SE*	Beta	*t*	*p*		95% Confidence Interval for B	
								Lower	Upper
Step 1	Constant	106.137	18.405		5.770	< .001	**	69.812	142.462
	Age	-0.671	0.373	-0.136	-1.800	0.074		-1.408	0.065
	Genetic determinism	0.068	0.028	0.181	2.400	0.018	*	0.012	0.123
Step 2	Constant	-170.086	35.579		-4.780	< .001	**	-240.312	-99.861
	Age	-0.534	0.312	-0.108	-1.710	0.089		-1.149	0.082
	Genetic determinism	0.032	0.024	0.086	1.340	0.183		-0.015	0.080
	Attitudes towards genetic testing	2.894	0.386	0.506	7.500	< .001	**	2.132	3.655
	Subjective norms	2.012	1.198	0.111	1.680	0.095		-0.352	4.377
Step 3	Constant	-114.642	46.593		-2.461	0.015	*	-206.617	-22.667
	Age	-0.427	0.322	-0.087	-1.327	0.186		-1.063	0.208
	Genetic determinism	0.028	0.024	0.075	1.159	0.248		-0.020	0.075
	Attitudes towards genetic testing	3.055	0.388	0.534	7.865	< .001	**	2.288	3.822
	Subjective norms	1.841	1.179	0.102	1.561	0.120		-0.487	4.169
	Perceived health competence	-1.642	0.658	-0.169	-2.497	0.013	*	-2.940	-0.344
	Internal locus of control	-0.629	0.801	-0.052	-0.785	0.433		-2.209	0.952
	Chance locus of control	-0.284	0.759	-0.025	-0.374	0.709		-1.781	1.214

Note. * $p < .05$, ** $p < .01$

Discussion

The current study sought to examine how interest in genetic testing would differ between physical and psychological health conditions. Additionally, it was considered whether interest in genetic testing would differ between conditions that typically develop later in life and those with a more proximal onset. The study employed the TPB to examine whether attitudes, subjective norms and perceived behavioural control would contribute to differences in interest in genetic testing between conditions of a physical or psychological nature.

It was hypothesised that participants would express increased interest toward genetic testing for physical health conditions over psychological health conditions. In line with this hypothesis, participants displayed significantly greater interest in being tested for physical conditions, in comparison to psychological conditions. Increased willingness to be tested for physical conditions was revealed for each of the individual physical disorders (type-2 diabetes and heart disease) compared with each of the psychological conditions (depression and schizophrenia), as well as when comparing the physical and psychological groups of disorders.

As a neurodegenerative disorder, Alzheimer's disease has been considered throughout the scientific literature to share aspects of both psychological (DeCarolis & Eisch, 2010) and physical disorders (Oliveri et al., 2018). For this reason, willingness to be tested for Alzheimer's disease was not included in the comparison of physical and psychological conditions, only in the comparison of proximal and distal conditions. Significantly higher interest was expressed towards testing for Alzheimer's disease, compared to both depression and schizophrenia, which may suggest that Alzheimer's disease was viewed to align more closely with physical disorders than as a typical "mental illness" within our sample.

According to the mixed-blessings model described by Haslam and Kvaale (2015) attributing a psychological condition to a genetic cause can lead to reduced blame as well as increased views of genetic essentialism, leading to social distancing, prognostic pessimism, and perceptions of instability. Even with reduced personal blame, interest in being tested for heritable psychological conditions could be impacted by essentialist beliefs. Further, limited mental health literacy that exists around the nature of psychological disorders and the interventions available to manage them (Furnham & Swami, 2020) may have prevented interest in testing for these conditions.

Reduced interest in testing for psychological conditions could be further attributed to the increased stigma associated with conditions of a psychological nature. Stigma prevents individuals from seeking help for psychological conditions (Haslam, 2011) and in the same vein, may have been responsible for reduced willingness to be tested for psychological conditions. Personal association with a psychological condition can impact on identity (Roberts & Kim, 2017), and negatively affect views of self (Corrigan & Rao, 2012). For this reason, increased risk may threaten sense of self agency and testing for psychological disorders may be viewed unfavourably.

Reduced willingness to be tested for psychological disorders has detrimental implications for those with an increased genetic risk for developing these conditions and is discouraging, as psychological disorders will affect around half of the population at some time in their lives (Furnham and Swami, 2020). Early intervention is valuable when managing psychological outcomes (Furnham & Swami, 2020). This is especially relevant as the capabilities of genetic testing expand and the genetic profiles of psychological disorders become better understood (Chapman et al., 2019), introducing greater opportunity for personally informed intervention and decision-making (Driver et al., 2020).

Hypothesis two predicted that participants would demonstrate decreased interest in testing for health conditions (both physical and psychological) with an onset in later life than those considered to have a proximal onset. It was anticipated that delay discounting would influence willingness to be tested for conditions known to present later in life, in a similar way that research has found individuals to discount the value of engaging in preventative health behaviours (Epstein et al., 2020) and screening for conditions that occur in later life (Bradford, 2010). A significant difference in willingness to be tested presented between proximal and distal conditions, however this occurred in the opposite direction to our prediction. Participants displayed higher interest in genetic testing for conditions of distal onset, specifically Alzheimer's disease and heart disease, in comparison to conditions of proximal onset; depression, schizophrenia and type-2 diabetes. A possible explanation for this result is that genetic testing is most sought after for conditions that can be prevented and treated (Driver et al., 2020), and distal conditions could be perceived as more responsive to intervention, as they are less imminent.

The valuation of a reward or benefit underpins the concept of delay discounting and in applying this approach to research, it would be important to consider that the receipt of genetic test results may not be viewed as a beneficial to some. Drawbacks to genetic testing can include experiencing hopelessness associated with essentialist beliefs and cognitive burden around decision making following receipt of genetic test results (Fisco Houfek et al., 2015). An incentive to using genetic testing tor the purpose of obtaining personalised risk information is that it can provide an opportunity to engage in lifestyle change and prevention strategies, or where options are limited or this is not available, the opportunity to make informed health and lifestyle choices (Roberts et al., 2017).

The current study drew on the TPB to explore a theoretical basis for uptake in genetic testing. Hypothesis three asserted that attitudes towards genetic testing, subjective norms,

internal locus of control and perceptions of self-efficacy in relation to health, would be associated with greater interest in genetic testing for physical conditions, but not for psychological conditions. Attitudes towards genetic testing provided significant value in predicting willingness to engage in testing for predisposition of both physical and psychological groups of conditions, as well as each of the disorders individually.

Subjective norms were not predictive of interest in testing for either physical or psychological disorders within our sample. This is in line with the findings of Wolff et al. (2011), who attributed this to underdeveloped subjective norms at that point in time. Although a decade has passed, genetic testing availability and accessibility is still developing (Wade et al., 2012), and genetic literacy remains limited within the community (Chapman et al., 2019), potentially explaining this result. In contrast, Zimmermann et al. (2021) found that interest in genetic testing for cancer disorders was influenced by the attitudes of social connections, particularly the views of blood relatives, however our study did not specify subjective norms as relating to blood relatives, but friends and family considered most important to the individual. The impact of social connections found by Zimmermann et al. (2021) may reflect the qualitative methodology of that particular study, where direct blood relatives were expressly considered.

Perceived behavioural control made a small contribution to prediction of interest in psychological conditions only. Three measures of perceived behavioural control were included in the current study; the PHCS, and two subscales of the MHLOC; Internal and Chance. We chose three measures because we believed that combining the self-efficacy and competency element of the PHCS and the multifaceted assessment of locus of control provided by the two subscales of the MHLOC scale would provide a more comprehensive measure of perceived behavioural control in relation to genetic testing. No significant correlations were found between either Internal or Chance subscale predictors and the

outcome measures, however the PHCS did have a significant effect on interest in testing for psychological conditions. A significant association also resulted between the PHCS and both depression and type-2 diabetes as individual outcome measures.

This can potentially be attributed to the items on the PHCS aligning with views on self-efficacy and capability in managing personal health outcomes. Examples of questions in this scale include: *"It is difficult for me to find effective solutions to the health problems that come my way."* and *"I succeed in the projects I undertake to improve my health."* In comparison, items on the MHLOC subscales related to more general health beliefs. Examples of these include: *"I am in control of my health"* (Internal subscale), *"If it's meant to be, I will stay healthy"* (Chance subscale). Therefore, while a more focused scale concentrating on health self-efficacy beliefs was associated with interest in genetic testing for psychological conditions, the more general scales centering on a broader examination of health locus of control were not.

Contribution to Literature in the Field

The current study has introduced unprecedented findings in comparing interest in uptake in genetic testing between physical and psychological, as well as proximal and distal disorders. Insight into which conditions people are not as willing to be tested for is important, as genetic information can make a valuable contribution to health management and decision making (Chapman et al., 2019). Within the emerging body of research exploring the personal and disorder-based factors involved with genetic testing uptake, researchers are not working from an established knowledge base. In pioneering research in this area, studies have produced results that are either quite nuanced or very broad (Sweeny et al., 2014).

It was the intention of the current study to explore how interest in genetic testing of psychological disorders would differ, comparative to physical disorders, and proximal onset disorders with distal conditions. Some of the factors that contribute to interest in genetic

testing are known, including a family history of a specific disorder (Meiser et al., 2020), perceptions of severity, preventability and treatability of a disorder (Oliveri et al., 2020), the penetrance of a condition (Kiln et al., 2014), the level of predictive accuracy offered by the test (Meiser et al., 2020) and attitudes towards genetic testing (Kiln et al., 2014; Wade et al., 2012; Wolff et al., 2011). Our findings contribute novel and meaningful insight into preferences held for genetic testing for physical rather than psychological disorders, as well as those that develop later in the lifespan.

In line with attribution theory, stigma is greater when it is believed that an individual is personally responsible for their health condition (Choe et al., 2020). While both disorders have a genetic basis, schizophrenia is associated with much more intense stigma than depression, related to greater attribution of blame to the person, as well as increased negative stereotyping (Choe et al., 2020). Nevertheless, even with differing levels of both stigma and negative perceptions between depression and schizophrenia, no significant difference in willingness towards genetic testing was observed between the two psychological conditions. However, there were significant differences of a small effect, between each of the psychological conditions and each of the physical conditions included in the study. This finding supports that broadly, the beliefs associated with condition type led to differences in interest in genetic testing within the different disorders, but not between psychological disorders, or between physical disorders. This further indicates that despite variations in the essence and composition of the psychological disorders included in the current study, and the unequal degree of stigma between these conditions, broad beliefs in testing for psychological conditions was less favourable than physical conditions; a finding which aligns with previous research (Choe et al., 2020).

The current study found partial support for the application of the TPB in this context, a robust theoretical basis for predicting uptake in genetic testing is yet to be established

(Horne et al., 2018). Attitudes were found to have the biggest predictive value in the variance of interest in genetic testing for all individual disorders as well as physical and psychological groups. This is consistent with prior studies by Kiln et al. (2014) and Wolff et al. (2011).

In agreement with results of the current study, Wolff et al. (2011) further found that perceived behavioural control did not provide predictive value for interest in genetic testing, however those researchers calculated perceived behavioural control in the context of self-efficacy towards the act of taking the test itself. In the current study, measures of perceived behavioural control encompassed health outcomes more broadly, in the context of the degree to which participants believe they are able to enact control over their own health outcomes, and how this as a construct would translate to willingness to participate in genetic testing for physical and psychological conditions.

Limitations

Limitations of the current study should be considered in interpretation of the results. A primary limitation of this research is that the cross-sectional approach provides insight into willingness to undertake genetic testing for each of the conditions at the point in time that the survey was completed. However, while intention is a strong predictor of future behaviour (McEachan et al., 2011), the intention-behaviour gap asserts that intention does not definitively determine behaviour (Hardie, 2015), and our measures did not allow observation of actual uptake in genetic testing, but rather hypothetical intention based on interest in undertaking genetic testing.

This was an exploratory study into the differences between physical and psychological conditions in genetic testing uptake. While it is acknowledged that the number of disorders (five) used in this study may limit generalisation, the conditions incorporated into the study were purposefully chosen with a focus on disorders that were well known within the community, which have a genetic component to them, and are known to be either a

physical or psychological disorder, as well as to typically develop in early-midlife or later in life. There are differences in the degree of stigma related to each of the conditions included in the study, especially between the psychological disorders, depression, and schizophrenia. To address this, future research may want to include a greater number of conditions within psychological and physical groups, or present participants with more generic terms rather than inferring interest towards broader psychological and physical groups of conditions by measuring willingness to be tested for specific disorders.

A further limitation of the current study is that the survey included an item asking participants whether they had previously had a genetic test. This item however did not specify the type of genetic testing previously undertaken. In acknowledging a prior genetic testing experience, participants may be indicating use for reasons other than identifying predisposition to health disorders, for example prenatal screening, or genetic testing for the purpose of ancestry. As past behaviour provides a strong indication of future behaviour (McEachan et al., 2011), this information could have been a valuable inclusion in controlling for this as a confounding factor.

While also advertised to the broader community, a main avenue of participant recruitment was through SONA for first year psychology students at UTAS. While unable to provide an exact estimate of the proportion of participants that were first year psychology students, it should be acknowledged that a prominent subset of the sample obtained for this study likely comprised this demographic.

As an additional limitation, Alzheimer's disease was initially considered for inclusion in the study as a distal psychological condition, however this condition was not included in the physical vs psychological analyses as this condition is not clearly delineated as being either physical or psychological in nature. Considering the findings of this study; that greater preference exists for genetic testing of physical conditions; it is possible that interest in distal

conditions could have been inflated because no psychological disorder was included in the distal category. Additionally, the preference to test for distal conditions may have been inflated by older participants viewing the conditions we labelled as distal as more proximally relevant to them personally.

Directions for Future Research

The current study was exploratory in nature and presents an introduction to the investigation into the factors associated with uptake in genetic testing between physical and psychological, proximal and distal health conditions. Future research has the opportunity to further refine the composition of physical, psychological, proximal and distal groups of disorders to incorporate greater inclusion of a more diverse range of conditions. Further, while no significant difference in willingness towards genetic testing was found between the psychological conditions, depression and schizophrenia in the current study, investigation into the effect of varying levels of stigma between psychological disorders on interest and willingness to be tested for predisposition for psychological disorders would be a valuable expansion of the findings of the current study.

While the current study found no effect of age on interest in genetic testing for proximal and distal conditions between those aged below 40 years and those aged 40 years and over, it is plausible that there is more to explore in terms of interest in testing for conditions relevant to an individual now compared to in the future. The disorders that are considered proximal and distal change throughout the lifespan, and by nature disorders considered to be distal earlier in life, become more immediately relevant as a person ages.

While not the focus of this study, this presents an interesting opportunity for exploration in subsequent research.

We observed a small correlation between age and beliefs in genetic determinism. The effect was small and not particularly compelling, which is potentially a true reflection of the

magnitude of the association between these variables, or possibly limited by our truncated sample size. Furthermore, we saw that there was a significant cumulative effect of age and beliefs in genetic determinism on interest in testing for psychological conditions, which potentially speaks to the correlation between age and genetic determinism. This is another potential avenue for future research in this area.

As an emergent field of study, a robust foundational theory is missing from the body of research investigating the factors associated with genetic testing uptake (Horne et al., 2018). The TPB was incorporated into the current study to test its utility in this space, however perceived behavioural control contributed only to interest in psychological disorders and subjective norms were not predictive of interest in this case. Future studies are encouraged to readdress the lack of theory in this area in order to identify a reliable model from which research can refer to, to assess genetic testing decisions in a uniform and consistent way.

Conclusions

Investigation into the personal and disorder-based factors that contribute to genetic testing decisions is advancing in line with accessibility and availability of genetic testing for a growing number of health conditions (Driver et al., 2020). Drawing on existing knowledge of the differences in views towards psychological and physical health disorders (Choe et al., 2020), the current study contributed to this developing body of research by comparing interest in genetic testing between physical and psychological conditions, finding greater willingness associated with testing for predisposition to disorders that are physical in nature.

The study considered the TPB as a foundation from which to predict interest in genetic testing for these conditions, and partial support was observed for the TPB as a framework for determining willingness to engage in genetic testing. In line with Wolff et al. (2011), attitudes were a robust predictor across all outcomes at both a group and individual

disorder level, while subjective norms and perceived behavioural control were not found to significantly predict interest in genetic testing within the sample.

This study further compared willingness to undertake genetic testing between proximal and distal conditions, finding support for increased interest in testing for conditions that develop in later life. This was the opposite result to that predicted and warrants more thorough investigation beyond the scope of its auxiliary inclusion in the current study.

Genetic testing can provide valuable insight into the personalised risk an individual holds of developing genetically based disorders, and this information can be used for the purpose of improving quality of life (Wessel et al., 2016) through targeted interventions and informed decision making (Driver et al, 2020). Treatments and preventative measures are available for psychological disorders (Choudhry et al., 2016) and these can be optimised with the use of precision medicine through genetic testing (Driver et al., 2020). However less favourable attitudes towards genetic testing for psychological disorders, resulting from higher levels of stigma, reduced genetic and mental health literacy present a barrier in willingness to be tested for predisposition to these conditions.

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Appendices

Appendix A

Ethics Approval Letter

Research Integrity and Ethics Unit

Ethics Approval Letter

10/05/2021

To: Dr Padgett

Project ID: 24764

Project Title: Factors associated with interest in using genetic testing to identify predisposition for psychological and physical health conditions

The above named project has been approved by the Tasmania Social Sciences Human Research Ethics Committee on the 10 May 2021.

Approval has been granted for the following documentation:

Submission Document Name	Submission Document File Name	Submission Document Type	Submission Document Date	Submission Document Version
24764 Appendix A1 On Campus Recruitment	24764 Appendix A1 On Campus Recruitment.docx	ADVERTISING MATERIAL	21/04/2021	1.1
24764 Appendix A2 Online Recruitment Slide	24764 Appendix A2 Online Recruitment Slide.pptx	ADVERTISING MATERIAL	21/04/2021	1.1
24764 Appendix C All measures	24764 Appendix C All measures.docx	QUESTIONNAIRE	21/04/2021	1.1
24764 Protocol for Factors associated with interest in using genetic testing to identify predisposition for psychological and physical health conditions	24764 Protocol for Factors associated with interest in using genetic testing to identify predisposition for psychological and physical health conditions .docx	PROTOCOL	07/05/2021	1.3
24764 Appendix B PICF	24764 Appendix B PICF.docx	PARTICIPANT INFORMATION AND CONSENT FORM	07/05/2021	1.3
24764 Cover letter 2	24764 Cover letter 2.docx	OTHER PROJECT-RELATED DOCUMENTATION	07/05/2021	1

The Tasmania Social Sciences Human Research Ethics Committee has provided approval for the project to be conducted at the following sites:

This is an online survey, so data will be collected at Sandy Bay, but from online responses

Please ensure that all investigators involved with this project have cited the approved versions of the documents listed within this letter and use only these versions in conducting this research project.

This approval constitutes ethical clearance by the Tasmania Social Sciences Human Research Ethics Committee. The decision and authority to commence the associated research may be dependent on factors beyond the remit of the ethics review process. For example, your research may need ethics clearance from other organisations or review by your research governance coordinator or Head of Department. It is your responsibility to find out if the approvals of other bodies or authorities are required. It is recommended that the proposed research should not commence until you have satisfied these requirements.

In accordance with the National Statement on Ethical Conduct in Human Research 2007 (updated 2018), it is the responsibility of institutions and researchers to be aware of both general and specific legal requirements, wherever relevant. If researchers are uncertain they should seek legal advice to confirm that their proposed research is in compliant with the relevant laws. University of Tasmania researchers may seek legal advice from Legal Services at the University.

All committees operating under the Human Research Ethics Committee (Tasmania) Network are registered and required to comply with the National Statement on the Ethical Conduct in Human Research 2007 (updated 2018).

Therefore, the Chief Investigator's responsibility is to ensure that:

(1) All investigators are aware of the terms of approval, and that the research is conducted in compliance with the HREC approved protocol or project description.

(2) Modifications to the protocol do not proceed until **approval** is obtained in writing from the HREC. This includes, but is not limited to, amendments that:

(i) are proposed or undertaken in order to eliminate immediate risks to participants;
(ii) may increase the risks to participants;
(iii) significantly affect the conduct of the research; or
(iv) involve changes to investigator involvement with the project.

Please note that all requests for changes to approved documents must include a version number and date when submitted for review by the HREC.

(3) Reports are provided to the HREC on the progress of the research and any safety reports or monitoring requirements as indicated in NHMRC guidance.

Guidance for the appropriate forms for reporting such events in relation to clinical and non-clinical trials and innovations can be located under the ERM "Help Tab" in "Templates". All adverse events must be reported regardless of whether or not the event, in your opinion, is a direct effect of the therapeutic goods being tested.

(4) The HREC is informed as soon as possible of any new safety information, from other published or unpublished research, that may have an impact on the continued ethical acceptability of the research or that may indicate the need for modification of the project.

(5) All research participants must be provided with the current Participant Information Sheet and Consent Form, unless otherwise approved by the Committee.

(6) This study has approval for four years contingent upon annual review. A Progress Report is to be provided on the anniversary date of your approval. Your first report is due on the anniversary of your approval, and you will be sent a courtesy reminder closer to this due date. Ethical approval for this project will lapse if a Progress Report is not submitted in the time frame provided.

(7) A Final Report and a copy of the published material, either in full or abstract, must be provided at the end of the project.

(8) The HREC is advised of any complaints received or ethical issues that arise during the course of the project.
(9) The HREC is advised promptly of the emergence of circumstances where a court, law enforcement agency or regulator seeks to compel the release of findings or results. Researchers must develop a strategy for addressing this and seek advice from the HREC.

Kind regards,

Ethics Executive Officer

UNIVERSITY*of*
TASMANIA

Appendix B

Participant Information Sheet and Consent Form

Factors associated with interest in using genetic testing to identify predisposition for psychological and physical health conditions

Research team ***Dr Christine Padgett,***
School of Psychological Sciences, University of Tasmania
Mrs Estelle Duggan, Honours student,
School of Psychological Sciences, University of Tasmania

Contact Phone: 6226 5718
Contact Email: Christine.Padgett@utas.edu.au

1. Invitation
You are invited to participate in a research study examining how people feel about genetic testing for psychological disorders. This study is being run by Dr Christine Padgett from the School of Psychological Sciences at the University of Tasmania. Before you decide to participate in this research, please read the information provided, and feel free to ask any questions if necessary.

2. What is the purpose of this study?
We are interested in whether people are more or less likely to have genetic tests for mental health conditions as compared to tests for physical health conditions, and whether people are more interested in tests for conditions that might occur later in life, as opposed to early adulthood.

3. Why have I been invited to participate?
You are eligible to participate in this study because you're either an undergraduate UTAS student, or a member from the general population over the age of 18. Participatio in this study is completely voluntary and there will be no consequence for individuals who do not wish to participate in this study.

4. What will I be asked to do?
You will be asked to complete an online survey. The survey includes a range of questions relating to the following:

- Your age, gender, and other general information about yourself
- How you rate your knowledge about genetic testing, and some general knowledge questions about genetics
- How 'in control' you feel in terms of your health and ability to access medical advice and support
- How you would feel about getting a genetic test for mental health conditions and physical health conditions

We expect the survey to take about 20-25 minutes to complete.

5. Are there any possible benefits from participation in this study?
It is not anticipated that your involvement in this study will result in any direct benefits. However, the data collected from this research will provide further understanding of how people make decisions about genetic testing.

After completing this study, non-psychology undergraduates and members of the general public will have the opportunity to go into the draw to win a $50 Coles/Myer gift voucher. First year psychology undergraduates from UTAS will be provided with the choice to either enter the gift voucher draw or receive 30 minute research participation course credit via SONA for their involvement in this study.

6. Are there any possible risks from participation in this study?
Other than the inconvenience of completing an online survey, there are no anticipated risks associated with this study. However, should you have any concerns please contact the investigators (see point 10 for contact details).

7. What if I change my mind during or after the study?
You are free to withdraw from the study at any point when you are completing the survey. However, as this survey is anonymous and there will be no identifiable data, we will not be able to retrieve and delete individual responses once the survey is completed.

8. What will happen to the data when this study is over?
All data that is collected from this study will be safely secured and kept confidential. It will be securely saved on a password-protected server in the School of Psychology. In accordance with National Ethics standards, we would like to indefinitely retain your anonymous (non-identified) data to also use in future related research projects. This data would not contain any identifying information about you.

9. How will the results of the study be published?
All data in this study will be anonymous. Data from this study will be discussed and published as an Honours thesis, and may be published elsewhere. If you wish to be notified on the results of this study, please feel free to contact us.

10. What if I have questions about this study?
If you have any queries, concerns or issues with this study, please feel free to contact us:

- Dr Christine Padgett: Email: Christine.Padgett@utas.edu.au or phone 6226 5718

This study has been approved by the Tasmania Health and Medical Human Research Ethics Committee. If you have concerns or complaints about the conduct of this study, you can contact the Executive Officer of the HREC (Tasmania) Network on (03) 6226 6254 or email human.ethics@utas.edu.au The Executive Officer is the person nominate to receive complaints from research participants. You will need to quote 24764.

11. How can I agree to be involved?
If you do wish to take part within this study, you will be required to select 'agree' on the following online consent form. Selecting 'agree' on the consent form will indicate that you agree to participate in this study, and you will then be directed to the survey.

Thank you for your time.

* **Participant Consent Form**

Clicking on the “I have read the information sheet and agree to participate in this study” button indicates that:

- You have read and understand the above information
- You voluntarily agree to participate
- You are 18 years of age or older

○ I have read the information sheet and agree to participate in this study

○ I do not agree to participate in this study

* If you ticked ‘yes’ above please select one of the below options:

I agree that my de-identified study data can be shared and used for future research projects in the same general area of this research

○ Yes

○ No

Appendix C

Survey items measuring interest in, and attitudes towards genetic testing.

The following questions will ask you about your interest in, and attitudes towards, getting a genetic test for several specific health conditions. Please answer as honestly as you can.

Genetic tests can be used to determine if a person is predisposed to having some medical conditions. This sort of test does not diagnose whether you have a condition – they just identify whether someone has genes that put them at greater risk than other of developing the condition than those who don't have the genes.

✱ The following questions relate to your interest in having a genetic test for ***depression***, which typically develops in early or mid adulthood (20s to 40s).

Using the sliding scale below, please indicate how interested you would be in getting a test to see if you had greater genetic risk of developing depression.

1 = I would never want a genetic test for depression to 100 = I would be extremely interested in a genetic test for depression.

1 | 1 | 100

✱ Please indicate how much you agree with the statements below, on a scale of 1-5, where 1 = Very Unlikely – 5 = Very Likely.

	1 - Very Unlikely	2 - Moderately Unlikely	3 - Neither Likely nor Unlikely	4 - Moderately Likely	5 - Very Likely
If a genetic test showed that my genetic make-up put me at greater risk of developing depression, I would regret having the test	○	○	○	○	○
If a genetic test showed that my genetic make-up put me at greater risk of developing depression, I would try to make lifestyle changes (eg increase exercise, eat healthier) to reduce the risk	○	○	○	○	○
If a genetic test showed that my genetic make-up put me at greater risk of developing depression, I would see a medical practitioner to get further advice	○	○	○	○	○
If a genetic test showed that my genetic make-up put me at greater risk of developing depression, I would be pleased that I had advance knowledge of the increased risk	○	○	○	○	○

✱ The following questions relate to your interest in having a genetic test for ***schizophrenia***, which typically develops in early adulthood.

Using the sliding scale below, please indicate how interested you would be in getting a test to see if you had greater genetic risk of developing schizophrenia.

1 = I would never want a genetic test for schizophrenia to 100 = I would be extremely interested in a genetic test for schizophrenia.

1 | 1 | 100

✱ Please indicate how much you agree with the statements below, on a scale of 1-5, where 1 = Very Unlikely – 5 = Very Likely.

	1 - Very Unlikely	2 - Moderately Unlikely	3 - Neither Likely nor Unlikely	4 - Moderately Likely	5 - Very Likely
If a genetic test showed that my genetic make-up put me at greater risk of developing schizophrenia, I would regret having the test	○	○	○	○	○
If a genetic test showed that my genetic make-up put me at greater risk of developing schizophrenia, I would try to make lifestyle changes (eg increase exercise, eat healthier) to reduce the risk	○	○	○	○	○
If a genetic test showed that my genetic make-up put me at greater risk of developing schizophrenia, I would see a medical practitioner to get further advice	○	○	○	○	○
If a genetic test showed that my genetic make-up put me at greater risk of developing schizophrenia, I would be pleased that I had advance knowledge of the increased risk	○	○	○	○	○

✱ The following questions relate to your interest in having a genetic test for ***heart disease***, which typically develops in late adulthood.

Using the sliding scale below, please indicate how interested you would be in getting a test to see if you had greater genetic risk of developing heart disease.

1 = I would never want a genetic test for heart disease to 100 = I would be extremely interested in a genetic test for heart disease.

1 (1 — 100)

✱ Please indicate how much you agree with the statements below, on a scale of 1-5, where 1 = Very Unlikely – 5 = Very Likely.

	1 - Very Unlikely	2 - Moderately Unlikely	3 - Neither Likely nor Unlikely	4 - Moderately Likely	5 - Very Likely
If a genetic test showed that my genetic make-up put me at greater risk of developing heart disease, I would regret having the test	○	○	○	○	○
If a genetic test showed that my genetic make-up put me at greater risk of developing heart disease, I would try to make lifestyle changes (eg increase exercise, eat healthier) to reduce the risk	○	○	○	○	○
If a genetic test showed that my genetic make-up put me at greater risk of developing heart disease, I would see a medical practitioner to get further advice	○	○	○	○	○
If a genetic test showed that my genetic make-up put me at greater risk of developing heart disease, I would be pleased that I had advance knowledge of the increased risk	○	○	○	○	○

✱ The following questions relate to your interest in having a genetic test for ***Type 2 diabetes*** (previously known as adult onset diabetes), which typically develops in mid adulthood.

Using the sliding scale below, please indicate how interested you would be in getting a test to see if you had greater genetic risk of developing Type 2 diabetes.

1 = I would never want a genetic test for diabetes to 100 = I would be extremely interested in a genetic test for diabetes.

1 (1 — 100)

✱ Please indicate how much you agree with the statements below, on a scale of 1-5, where 1 = Very Unlikely – 5 = Very Likely.

	1 - Very Unlikely	2 - Moderately Unlikely	3 - Neither Likely nor Unlikely	4 - Moderately Likely	5 - Very Likely
If a genetic test showed that my genetic make-up put me at greater risk of developing type 2 diabetes, I would regret having the test	○	○	○	○	○
If a genetic test showed that my genetic make-up put me at greater risk of developing type 2 diabetes, I would try to make lifestyle changes (eg increase exercise, eat healthier) to reduce the risk	○	○	○	○	○
If a genetic test showed that my genetic make-up put me at greater risk of developing type 2 diabetes, I would see a medical practitioner to get further advice	○	○	○	○	○
If a genetic test showed that my genetic make-up put me at greater risk of developing type 2 diabetes, I would be pleased that I had advance knowledge of the increased risk	○	○	○	○	○

✱ The following questions relate to your interest in having a genetic test for ***Alzheimer's disease*** (the most common form of dementia), which typically develops in late adulthood.

Using the sliding scale below, please indicate how interested you would be in getting a test to see if you had greater genetic risk of developing Alzheimer's disease.

1 = I would never want a genetic test for Alzheimer's disease to 100 = I would be extremely interested in a genetic test for Alzheimer's disease.

1 | 100

✱ Please indicate how much you agree with the statements below, on a scale of 1-5, where 1 = Very Unlikely – 5 = Very Likely.

	1 - Very Unlikely	2 - Moderately Unlikely	3 - Neither Likely nor Unlikely	4 - Moderately Likely	5 - Very Likely
If a genetic test showed that my genetic make-up put me at greater risk of developing Alzheimer's disease, I would regret having the test	○	○	○	○	○
If a genetic test showed that my genetic make-up put me at greater risk of developing Alzheimer's disease, I would try to make lifestyle changes (eg increase exercise, eat healthier) to reduce the risk	○	○	○	○	○
If a genetic test showed that my genetic make-up put me at greater risk of developing Alzheimer's disease, I would see a medical practitioner to get further advice	○	○	○	○	○
If a genetic test showed that my genetic make-up put me at greater risk of developing Alzheimer's disease, I would be pleased that I had advance knowledge of the increased risk	○	○	○	○	○

Appendix D

Survey items related to subjective norms

The following questions relate to the opinions of close friends and family.

* Please indicate how much you agree with the statements below, on a scale of 1-5, where 1 = strongly disagree and 5 = strongly agree.

	Strongly dis-agree	Disagree	Neither agree or dis-agree	Slightly agree	Strongly agree
The people most important to me (e.g. close family or friends) would probably think it would be a good idea to take a genetic test	○	○	○	○	○
If I were to decide to get a genetic test, I think the people most important to me would support me	○	○	○	○	○
I think most people who are important to me would approve of me getting a genetic test	○	○	○	○	○
I think most people who are important to me would consider genetic testing to be a negative thing	○	○	○	○	○
I think most people who are important to me would think genetic testing is a waste of time	○	○	○	○	○

Appendix E

Regression tables for individual disorders

Table 7

Hierarchical Regression Results Showing Relationship of Predictor Variables with Interest in Genetic Testing for Depression

Model		*B*	*SE*	Beta	*t*	*p*		95% Confidence Interval for B	
								Lower	Upper
Step 1	Constant	49.677	10.063		4.940	< .001	**	29.816	69.538
	Age	-0.242	0.204	-0.090	-1.190	0.237		-0.645	0.161
	Genetic determinism	0.034	0.015	0.168	2.210	0.029	*	0.004	0.064
Step 2	Constant	-87.552	20.345		-4.303	< .001	**	-127.709	-47.395
	Age	-0.178	0.178	-0.066	-0.997	0.320		-0.530	0.174
	Genetic determinism	0.019	0.014	0.092	1.354	0.178		-0.009	0.046
	Attitudes towards genetic testing	1.305	0.221	0.420	5.913	< .001	**	0.869	1.740
	Subjective norms	1.525	0.685	0.155	2.226	0.027	*	0.173	2.877
Step 3	Constant	-59.606	26.591		-2.242	0.026	*	-112.097	-7.116
	Age	-0.106	0.184	-0.039	-0.575	0.566		-0.468	0.257
	Genetic determinism	0.016	0.014	0.080	1.189	0.236		-0.011	0.043
	Attitudes towards genetic testing	1.414	0.222	0.455	6.380	< .001	**	0.977	1.852
	Subjective norms	1.423	0.673	0.145	2.115	0.036	*	0.095	2.752
	Perceived health competence	-0.907	0.375	-0.171	-2.417	0.017	*	-1.648	-0.166
	Internal locus of control	-0.437	0.457	-0.067	-0.957	0.340		-1.339	0.465
	Chance locus of control	0.007	0.433	0.001	0.016	0.988		-0.848	0.861

Note. * $p < .05$, ** $p < .01$

Table 8

Hierarchical Regression Results Showing Relationship of Predictor Variables with Interest in Genetic Testing for Schizophrenia

Model		*B*	*SE*	Beta	*t*	*p*		95% Confidence Interval for B	
								Lower	Upper
Step 1	Constant	56.460	10.561		5.350	< .001	**	35.617	77.302
	Age	-0.429	0.214	-0.152	-2.010	0.046		-0.852	-0.007
	Genetic determinism	0.034	0.016	0.157	2.080	0.039	*	0.002	0.066
Step 2	Constant	-82.534	21.243		-3.885	< .001	**	-124.463	-40.605
	Age	-0.356	0.186	-0.126	-1.913	0.057		-0.724	0.011
	Genetic determinism	0.014	0.014	0.064	0.941	0.348		-0.015	0.042
	Attitudes towards genetic testing	1.589	0.230	0.485	6.899	< .001	**	1.135	2.044
	Subjective norms	0.487	0.715	0.047	0.681	0.497		-0.925	1.899
Step 3	Constant	-55.036	28.190		-1.952	0.053		-110.684	0.613
	Age	-0.322	0.195	-0.114	-1.651	0.100		-0.706	0.063
	Genetic determinism	0.012	0.015	0.054	0.793	0.429		-0.017	0.040
	Attitudes towards genetic testing	1.641	0.235	0.501	6.981	< .001	**	1.177	2.105
	Subjective norms	0.418	0.714	0.040	0.586	0.559		-0.991	1.826
	Perceived health competence	-0.735	0.398	-0.132	-1.847	0.067		-1.520	0.051
	Internal locus of control	-0.192	0.484	-0.028	-0.395	0.693		-1.148	0.765
	Chance locus of control	-0.291	0.459	-0.044	-0.633	0.528		-1.197	0.616

Note. * $p < .05$, ** $p < .01$

Table 9

Hierarchical Regression Results Showing Relationship of Predictor Variables with Interest in Genetic Testing for Type-2 Diabetes

Model		*B*	*SE*	Beta	*t*	*p*		95% Confidence Interval for B	
								Lower	Upper
Step 1	Constant	58.598	9.960		5.883	< .001	**	38.940	78.256
	Age	-0.084	0.202	-0.032	-0.417	0.677		-0.483	0.314
	Genetic determinism	0.029	0.015	0.144	1.883	0.061		-0.001	0.059
Step 2	Constant	-62.683	20.545		-3.051	0.003	**	-103.233	-22.133
	Age	-0.021	0.180	-0.008	-0.115	0.909		-0.376	0.335
	Genetic determinism	0.012	0.014	0.057	0.823	0.412		-0.016	0.039
	Attitudes towards genetic testing	1.374	0.223	0.449	6.169	< .001	**	0.935	1.814
	Subjective norms	0.474	0.692	0.049	0.685	0.494		-0.892	1.839
Step 3	Constant	-47.084	27.175		-1.733	0.085		-100.727	6.559
	Age	0.066	0.188	0.025	0.349	0.728		-0.305	0.436
	Genetic determinism	0.008	0.014	0.040	0.570	0.569		-0.020	0.036
	Attitudes towards genetic testing	1.454	0.227	0.475	6.417	< .001	**	1.007	1.901
	Subjective norms	0.382	0.688	0.039	0.555	0.580		-0.976	1.739
	Perceived health competence	-0.863	0.384	-0.166	-2.250	0.026	*	-1.620	-0.106
	Internal locus of control	0.116	0.467	0.018	0.247	0.805		-0.806	1.037
	Chance locus of control	0.022	0.442	0.004	0.049	0.961		-0.852	0.895

Note. * $p < .05$, ** $p < .01$

Table 10

Hierarchical Regression Results Showing Relationship of Predictor Variables with Interest in Genetic Testing for Heart Disease

Model		*B*	*SE*	Beta	*t*	*p*		95% Confidence Interval for B	
								Lower	Upper
Step 1	Constant	65.868	9.782		6.733	< .001	**	46.562	85.175
	Age	-0.168	0.198	-0.065	-0.846	0.399		-0.559	0.224
	Genetic determinism	0.024	0.015	0.122	1.589	0.114		-0.006	0.053
Step 2	Constant	-69.861	19.578		-3.568	< .001	**	-108.502	-31.219
	Age	-0.101	0.172	-0.039	-0.591	0.555		-0.440	0.237
	Genetic determinism	0.007	0.013	0.037	0.541	0.589		-0.019	0.033
	Attitudes towards genetic testing	1.379	0.212	0.460	6.496	< .001	**	0.960	1.798
	Subjective norms	1.158	0.659	0.122	1.756	0.081		-0.143	2.459
Step 3	Constant	-87.501	26.237		-3.335	0.001	**	-139.292	-35.709
	Age	-0.081	0.181	-0.031	-0.445	0.657		-0.439	0.277
	Genetic determinism	0.007	0.014	0.036	0.521	0.603		-0.020	0.034
	Attitudes towards genetic testing	1.380	0.219	0.460	6.308	< .001	**	0.948	1.812
	Subjective norms	1.168	0.664	0.123	1.759	0.080		-0.143	2.479
	Perceived health competence	0.188	0.370	0.037	0.507	0.613		-0.543	0.919
	Internal locus of control	0.252	0.451	0.040	0.559	0.577		-0.638	1.142
	Chance locus of control	0.314	0.427	0.052	0.736	0.463		-0.529	1.158

Note. * $p < .05$, ** $p < .01$

Table 11

Hierarchical Regression Results Showing Relationship of Predictor Variables with Interest in Genetic Testing for Alzheimer's Disease

Model		*B*	*SE*	Beta	*t*	*p*		95% Confidence Interval for B	
								Lower	Upper
Step 1	Constant	59.349	10.390		5.712	< .001	**	38.843	79.856
	Age	-0.084	0.211	-0.030	-0.396	0.692		-0.499	0.332
	Genetic determinism	0.024	0.016	0.116	1.511	0.133		-0.007	0.056
Step 2	Constant	-69.555	21.170		-3.286	0.001	**	-111.339	-27.771
	Age	-0.014	0.186	-0.005	-0.073	0.942		-0.380	0.353
	Genetic determinism	0.004	0.014	0.021	0.306	0.760		-0.024	0.033
	Attitudes towards genetic testing	1.540	0.230	0.484	6.707	< .001	**	1.087	1.993
	Subjective norms	0.192	0.713	0.019	0.269	0.788		-1.215	1.599
Step 3	Constant	-78.765	28.320		-2.781	0.006	*	-134.668	-22.862
	Age	0.063	0.196	0.023	0.323	0.747		-0.323	0.450
	Genetic determinism	0.002	0.015	0.009	0.128	0.898		-0.027	0.031
	Attitudes towards genetic testing	1.585	0.236	0.499	6.715	< .001	**	1.119	2.051
	Subjective norms	0.145	0.717	0.014	0.203	0.840		-1.270	1.560
	Perceived health competence	-0.357	0.400	-0.066	-0.894	0.373		-1.146	0.432
	Internal locus of control	0.409	0.487	0.061	0.841	0.402		-0.551	1.370
	Chance locus of control	0.319	0.461	0.050	0.692	0.490		-0.591	1.229

Note. * $p < .05$, ** $p < .01$