# Preferences for Depression Treatment and the Role of Health Literacy



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## ORIGINALITY STATEMENT

I hereby declare that this submission is my own work and, to the best of my knowledge, it contains no materials previously published or written by another person, or substantial proportions of material which have been accepted for the award of any other degree or diploma at Macquarie University or any other educational institution, except where due acknowledgement is made in the thesis. Any contribution made to the research by others is explicitly acknowledged in the thesis. I also declare that the intellectual content of this thesis is the product of my own work, except to the extent of assistance from others in the project's design and conception or in style, presentation and linguistic expression is acknowledged. The study was approved by Macquarie University Human Research Ethics Committee HREC, Humanities & Social Sciences Committee, Reference No:52021984428002.

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## Acknowledgement

## Dedication

I would like to dedicate this research to every person with lived experience of mental illness, to every person who feels like no one would understand, to every person who feels like there's no purpose to survive and is beyond help, to every suicide survivor and every suicide victim. I hope, from the bottom of my heart, that this is only one step closer towards understanding what could be done to provide people with the support and treatment they deserve.

# Abstract

There is an increasing interest in understanding people's preferences for depression treatment in Australia. While several treatments are available, individuals are underutilising them. The objective of this study was to elicit treatment preferences for people who have been diagnosed with depression in the past five years, and explore whether health literacy played a role in treatment preferences.

A total of 1,015 Australian individuals completed an online survey which included a Discrete Choice Experiment (DCE). Individuals chose repetitively between hypothetical depression treatments that varied in six attributes: treatment type, cost, effectiveness, side-effects, number of visits and waiting time. Health literacy was measured using a validated, multidimensional tool called the Health Literacy Questionnaire (HLQ). Data were first analysed using a conditional logit model, followed by a mixed logit model to account for observed and unobserved heterogeneity. Relative importance and willingness to pay (WTP) of treatment attributes were estimated.

Results suggest that treatment cost, effectiveness and side-effects are the most important predictors of choice. Individuals are willing to pay substantial amounts to avoid treatments that cause sexual side-effects, gastrointestinal side-effects and weight gain. Significant preference heterogeneity was observed, and subgroup analyses suggested that these differences are partially driven by health literacy patterns and gender. Variation in preferences was also observed between people who are currently receiving treatment and people who were diagnosed with depression but aren't currently receiving treatment.

Our findings provide useful information about individuals' treatment preferences, the factors associated with these preferences and health literacy strengths and weaknesses for people diagnosed with depression. This study provides useful inputs for health care providers and policy makers to better understand issues that need to be addressed for better mental health outcomes.

# 1. Introduction

Depression is one of the most common mental health disorders that affects more than 264 million people worldwide (WHO, 2020). Its role as a leading contributor to the global burden of disease is on the rise (WHO, 2020). Around 20% of Australian people suffer from mental ill health, with depression affecting more than 10% of the population in 2017-2018 (ABS, 2018). Given that depression can result from a combination of psychological, genetic and social factors, management is available through psychological interventions (e.g., Cognitive Behavioural Therapy), pharmacotherapy (e.g., anti-depressants), or a combination of both (WHO, 2020). Among all psychiatric illnesses, depression is one of the most significant risk factor for suicide (Bachmann, 2018). In 2020, 3,139 individuals died by suicide in Australia, with more than two-thirds of those having mental health disorders (ABS, 2021).

Mental illness and suicide cost the Australian economy between $43 billion to $70 billion annually, with an additional $151 billion resulting from reduced health and life expectancy (Conn, 2021). The Productivity Commission (PC) completed a mental health inquiry in 2020 making recommendations across several areas, such as prevention and early intervention, training and recovery focused care (Conn, 2021). The response of the Australian government in 2021-2022 Federal Budget included investing $2.3 billion over four years as a response for the PC's recommendations (AIHW, 2022). This included investing in 5 pillars: (1) Prevention and early intervention (2) suicide prevention (3) treatment (4) supporting the vulnerable and (5) work force and governance (Department of Health, 2022a). The National Mental Health and Suicide Prevention Plan identifies the Australian Government's measures and commitments to improving the lives of people with lived experience. The Mental Health and Suicide Prevention Plan aims to improve this by addressing the current inefficiencies and obstacles in the Australian mental health system. (Department of Health, 2022c).

Health Literacy (HL) studies are gaining popularity as individuals' ability to take an active role in their treatment decisions is a key consideration for patient-centred health services (Dodson et al., 2015). Health literacy is defined as "the cognitive and social skills which determine the motivation and ability of individuals to gain access to, understand and use information in ways which promote and maintain good health" (Nutbeam, 1998). Health literacy has been treated as a 'patient' challenge that the health care system has to overcome (Pleasant & Kuruvilla, 2008). This fails to address the complexity of HL as a multidimensional tool that involves interactions between both the patient and health care providers.

Even though self-management of illness and self-decision-making benefit from adequate health literacy skills, studies assessing the impact of health literacy on patients' treatment preferences for mental disorders are limited. Treatment preferences can be partially explained by the attributes that define the treatment (e.g., cost, effectiveness), however, external individual and system factors that can significantly impact treatment choices are less explored. Some of these factors are the patients' relationship with the healthcare provider and the support individuals receive (Ride & Lancsar, 2016).

One group of studies undertook Stated Preference (SP) approaches to elicit preferences for mental health treatments in general or for depression specifically. No studies explored the correlation between preferences and the level of an individuals' health literacy. Another group of studies explored how Mental Health Literacy (MHL) can influence treatment preferences. However, existing MHL tools are uncomprehensive and unidimensional, limiting their use for informing policy makers (O'Connor et al., 2014) and for bridging the gap between health literacy and mental health treatment seeking.

Some studies have explored health literacy for individuals with mental health conditions. However, these studies have predominantly focused on one aspect of health literacy (e.g., reading and understanding prescriptions) and failed to explore more complex dimensions (Choudhry et al., 2019). To our knowledge there are no studies that have assessed the relationship between multiple health literacy domains and treatment preferences for depression.

Health literacy in Australia has been a part of the national health goals and targets since 1993 (Nutbeam & Wise, 1993), with mental health care being one of the major areas for reform. While Australia does not yet have a set of policies that address health literacy, health literacy is a key component of safety and quality care (Care, 2015), and can influence mental health policy, the demand and supply of care services, and mental health outcomes. Improving health literacy of Australians could be associated with better treatment adherence and making informed decisions about one's treatment and illness management (Care, 2015).

The objective of our research was to elicit pharmacotherapy and psychotherapy treatment preferences for Australian adults who have been diagnosed with depression, and explore the relationship between health literacy and treatment preferences. Preferences are elicited using a Discrete Choice Experiment (DCE), while health literacy was assessed using a comprehensive, validated tool, called the Health Literacy Questionnaire (HLQ) (Osborne et al., 2013). Other

data that might affect patients' preferences for depression treatment were also collected. These include: (1) mental health treatment beliefs, (2) sociodemographic characteristics and (3) depression severity. To our knowledge, this is the first study to comprehensively measure associations between different dimensions of health literacy and preferences for depression treatment.

This study tests several hypotheses. First, cost is one of the most important predictors of choice due to the possibility of significant out-of-pocket costs for mental health treatment in Australia. Second, individuals with higher health literacy are expected to prefer a combination treatment over pharmacology or pharmacotherapy alone. Third, individuals with low health literacy levels will prefer a lower number of visits to the GP/specialist and shorter waiting times. Finally, males will disfavour treatment that include psychotherapy and medications that cause sexual dysfunction.

## 2. Background
### 2.1 Preference elicitation techniques
Preference elicitation techniques can be categorised as revealed preferences (RP) or stated preferences (SP), both of which are based on the Random Utility Theory (RUT). While stated preference methods rely on individuals' statements about their preferences in a hypothetical scenario, revealed preference methods assume that preferences can be observed and revealed in the market. Even though observing choices could be an appropriate method to elicit preferences, revealed preference techniques are problematic in markets that are not well observed.

Two Stated Preference (SP) approaches have gained popularity to elicit preferences for healthcare services, most recently focusing on mental health treatments and services (Larsen et al., 2021). These methods are Conjoint Analysis (CA) and Discrete Choice Experiments (DCEs). Even though the two terms are often used interchangeably, CA and DCEs are somewhat distinct (Louviere et al., 2010). In simple terms, CA is a mathematical application that considers the behaviour of numeric systems, while DCEs are a behavioural choice theory that explain human behaviour based on Random Utility Theory (RUM) (Louviere et al., 2010).

CA and DCEs have been used to elicit preferences of carers, parents and health care providers, but most studies used these methods to elicit patient preferences for health services (Larsen et al., 2021). In their scoping review, Larsen et al. (2021) reported that most studies using these two approaches elicit preferences for mental health conditions 'in general', while only a few

elicit preferences for specific disorders, such as depression, substance use, attention deficit hyperactivity disorder (ADHD) and others.

## 2.1.1 Discrete Choice Experiments

We undertook a rapid review of the literature and found three studies that used a DCE and five studies used CA to elicit patient preference for depression treatment. Lokkerbol et al. (2019) assessed treatment preferences for patients who were undertaking treatment and those who had received treatment in the past 12 months. DCE attributes included level of treatment digitalisation (e.g., face-to-face vs. online), group size, waiting time before commencement of treatment, and frequency of treatment. The random parameter logit model showed that treatment digitalisation was most valued by the respondents. Waiting time was less important, while treatment intensity was of least importance (Lokkerbol et al., 2019). Patients generally did not favour fully digitalised treatment (Lokkerbol et al., 2019).

While this study offers some insight about the relative importance of depression treatment characteristics, using only four attributes ignored other attributes that might influence choice, such as treatment effectiveness, treatment cost and the treatment type (e.g., anti-depressants vs. psychotherapy). This could have resulted in omitted variable bias (Coast et al., 2012). Additionally, respondents were not provided with information about the efficacy of digital vs. face-to-face treatments, despite strong patient beliefs about lower efficacy of online mental health treatments compared to face-to-face services (Phillips et al., 2021). Therefore, the results about favouring face-to-face treatment could be driven by patients' beliefs and perceptions about e-mental health which were not assessed in this study.

Ride and Lancsar (2016) conducted a DCE to explore factors that might improve treatment uptake for Australian women with perinatal depression and anxiety (PNDA). The mixed logit model results showed that low-cost treatments with high effectiveness increased the likelihood of choosing that particular package, with cost having relatively a stronger impact than effectiveness (Ride & Lancsar, 2016). Cost and treatment type were the most important attributes, followed by effectiveness (Ride & Lancsar, 2016). The use of an anti-depressant medication was the least preferred among all other treatment types. Treatment preferences varied across different sub-groups. Treatment with high effectiveness was more likely to be chosen by women who have high educational backgrounds (Ride & Lancsar, 2016). Individual counselling was generally the most preferred recommended-treatment, except for women who were not breastfeeding after birth (Ride & Lancsar, 2016).

One major limitation in this DCE was using the total cost of the treatment, without deducting the refunds people are expected to receive from their public or private health insurance. People make decisions based on their out-of-pocket costs (Wanders et al., 2014), rather than the healthcare system cost. Using the total up-front cost might indicate that the cost attribute did not truly reflect the preferences of Australian women, and thus the cost coefficient is likely to be biased. This is particularly important in the Australian context since Australia has a publicly-funded universal healthcare system (i.e., Medicare) that provides mental healthcare at a reduced cost or no cost for most citizens. Patients who have a Mental Health Treatment Plan or a referral by a health professional are partially or fully bulk billed for their treatments (Jorm, 2018). Rebates under the Mental Health Treatment Plan cover up to 20 sessions per year in 2021-2022 (Health Direct, 2021). The total out-of-pocket costs for each patient depend on the duration of each session, the number of sessions and the fees set by the psychologist/ psychiatrist. Another limitation in the DCE was that the upper bound of the treatment cost level was $200, which is an underestimation. According to the Australian Psychological Society (APS) National Schedule of Recommended Fee for 2021-2022, a 45-60-minute psychological consultation could cost up to $267 for psychological consultations. This fee could go up to $502 for 91-120-minute consultations.

Morey et al. (2007) conducted a DCE to elicit treatment preferences for people with Major Depressive Disorder (MDD) and to investigate patients' Willingness to Pay (WTP) and Willing to Accept (WTA) to eliminate depression. Treatment effectiveness, hours of psychotherapy, use of pharmacotherapy, treatment cost, and treatment side-effects were all predictors of choice (Morey et al., 2007). Results showed that patients were willing to pay substantial amounts to eliminate depression, but their WTP decreased when treatment caused side effects. Adding one side-effect (weight gain) decreased the representative individual's WTP by around 40%, while adding two side effects (inability to orgasm and low sexual drive) decreased the WTP by around 67% (Morey et al., 2007). These results highlight the importance of incorporating side-effects or adverse events when evaluating preferences for depression treatment.

One limitation of this study was the relatively small sample size (n=104). Small sample sizes in DCEs could negatively affect the statistical power of the estimates leading to low generalizability and incorrect insights for policy makers (de Bekker-Grob et al., 2015). Additionally, the study only measured observed heterogeneity through variations in sociodemographic characteristics due to the small sample size (Morey et al., 2007). The probability of choosing a depression treatment type was estimated as a function of available

treatment alternatives and observed demographic characteristics only. This study could have been improved by having a bigger sample to explore potential interactions between the DCE attributes. While most health-related studies using DCEs only consider main effects, empirical evidence suggests that attributes can interact in important and significant ways (Louviere et al., 2000)

### 2.1.2 Conjoint Analysis

Our rapid review of the literature also discovered five studies that elicited patient depression treatment preferences using conjoint analysis. Dwight-Johnson et al. (2010) investigated treatment preferences for depressed low-income Latino patients. Patients had a stronger preference for counselling or a combination treatment that included both counselling and medication (Dwight-Johnson et al., 2010). This indicates the importance of including combination treatments of psychotherapy and anti-depressants in future studies. The results of the conjoint analysis showed that receiving a treatment in a primary care setting was preferred over receiving it in a specialised mental health facility. The study included general treatment barrier reduction attributes, such as family involvement and transportation assistance. Lower barriers were associated with higher treatment acceptability (Dwight-Johnson et al., 2010). The authors reported that there was an association between treatment type preference and other individual characteristics, such as depression severity and personal knowledge about psychotherapy.

Wittink et al. (2010) also conducted a conjoint analysis to understand patients' preferences for the different attributes of both psychotherapy and pharmacotherapy treatments for depression. Results showed that treatment type was the most significant determinant of choice and that individuals avoided treatments that included severe side-effects. Similar to the results of Dwight-Johnson et al. (2010), respondents preferred receiving treatment in a primary care setting instead of a mental health facility. However, the sample included 86 adults that were not necessarily depressed, so elicited preferences may be different than if sought from patients with depression.

Another potential limitation of this study was that each respondent undertook 18 choice tasks. Having to trade-off repetitively between similar alternatives is a cognitively demanding task, which could potentially lead to biased results (Lancsar & Louviere, 2008). The study did not report whether this had been taken into consideration, or whether respondents' might have been cognitively burdened while undertaking the survey. This issue is often underreported in SP studies, an aspect that future studies can improve upon (Maddala et al., 2003). Designing a

DCE involves considering statistical efficiency as well as the complexity of the experiment that affects model parameters and variance (Bech et al., 2011). The increase in the number of choice tasks causing fatigue and cognitive effort introduces a trade-off between additional observations and the accuracy of choices. This implies that 'behavioural noise' may contribute to greater choice inaccuracy and potentially a change in respondents' decision strategy to look for simple information (Bech et al., 2011).

Another CA elicited depression treatment preferences for older white males and Mexican males. M. D. Johnson et al. (2013) reported that white men preferred medications over counselling while Mexican men preferred counselling over medication. This highlights the importance of understanding the variation of preferences across different demographic characteristics and the barriers and facilitators of treatment. Results also showed that both white and Mexican men preferred treatments that included family involvement.

Finally, Zimmermann et al. (2013) elicited treatment outcome preferences for those who were currently or previously receiving anti-depressants only. The most important outcomes were related to feeling less tired/ fatigued and having less side effects (Zimmermann et al., 2013). In another CA, Japanese undergraduates generally preferred combination treatments (anti-depressants and psychotherapy) despite it being the most costly (Okumura & Sakamoto, 2012). Transportation time and treatment type were relatively the most important treatment attributes (Okumura & Sakamoto, 2012).

## 2.2 Health Literacy

The term "Health Literacy" was introduced to the literature in the 1970s in the field of public health (Simonds, 1974). Health literacy not only refers to individuals' ability to understand and process health information, but also their ability to deal with the complexities at hand (Paasche-Orlow & Wolf, 2007). Historically, health literacy studies focused on one's ability to read and understand health information such as prescriptions, despite health literacy being a multidimensional construct (Choudhry et al., 2019).

Health literacy has been described as containing three dimensions: (1) functional health literacy (e.g., skills in reading and writing), (2) interactive health literacy (e.g., social and intellectual skills to participate in the health care system) and (3) critical health literacy (e.g., advanced intellectual skills to critically assess information) (Nutbeam, 2000). Despite the current emphasis on using comprehensive health literacy tools, and the limited information that

unidimensional measures provide, studies on functional literacy (e.g., skills in reading and writing) remain prominent. (Degan et al., 2019).

To avoid the limitations of unidimensional measures, Osborne et al. (2013) developed a self-reported, multidimensional tool that addresses the full spectrum of health literacy. The Health Literacy Questionnaire (HLQ) is a robust measure that has superior psychometric properties, reliability and construct validity (Osborne et al., 2013). It consists of 44 items, covering 9 diverse elements of health literacy that evaluate the challenges faced by patients and organisations. These domains are: "(1) Feeling understood and supported by healthcare providers, (2) having sufficient information to manage one's health, (3) actively managing one's health, (4) social support for health, (5) appraisal of health information, (6) ability to actively engage with healthcare providers, (7) navigating the healthcare system, (8) ability to find good health information, and (9) understanding health information well enough to know what to do" (Osborne et al., 2013). These elements evaluate individuals' ability to access, understand and participate in health care services (Osborne et al., 2013).

### 2.2.1 What we know so far about health literacy

Sub optimal health literacy, defined by the lowest two levels of health literacy scoring across five domains, is believed to affect 60% of Australians (Jessup et al., 2018). Health literacy for individuals with mental health conditions remains understudied, as most health literacy studies involve general populations (Degan et al., 2019). The few studies that have explored health literacy for individuals with mental health conditions have generally recruited samples with 'any' mental health diagnosis (Degan et al., 2019).

People who experience mental ill health are more likely to have lower levels of health literacy and poorer health outcomes, compared to those with no mental illness (Degan et al., 2019). Individuals with lower health literacy levels can struggle to discuss their concerns with their health care providers and may not feel supported or empathised with, resulting in a poorer patient-provider relationship and worse health outcomes (Degan et al., 2019; Friis et al., 2016). Low levels of functional literacy can limit knowledge about an individual's illness, self-management skills and treatment adherence in general (Souza et al., 2014; Williams et al., 1998). However, little is known about how other HL elements could impact these skills. Brabers et al. (2017) reported that 'advanced' health literacy dimensions, such as critically assessing health information, is positively correlated with higher involvement in treatment decision-making.

A substantial proportion of patients with chronic conditions have comorbidities that require additional capacities and skills to successfully understand and navigate the health care system for all their healthcare needs. This is also true in mental health studies as there is a significant overlap between the symptoms of depression and anxiety, in addition to other mental health illnesses (Gorman, 1996). Mental health comorbidities highlight the importance of exploring health literacy needs for people with mental ill health, and how it's associated with their treatment choices.

Understanding the relationship between multidimensional health literacy and treatment choices of people with mental ill health is limited. To our knowledge, ours is the first study to assess whether there exists an association between individuals' health literacy across multiple domains and depression treatment preferences.

People who experience mental health illness are more likely to have lower levels of health literacy and poorer health outcomes (Degan et al., 2019). However, the mechanisms through which health literacy affects mental health outcomes is not yet completely understood. There has been suggested sets of pathways between health literacy and health outcomes, yet causation has not yet been clearly established. These pathways consist of patient factors (eg: knowledge and beliefs), provider factors (eg: patient-centred care), and system factors (eg: complexity of health care coverage plans) (Paasche-Orlow & Wolf, 2007). See **Figure 1.1**. Therefore, understanding the mechanisms through which health literacy influences treatment preferences can potentially test the theorised casual pathways and add a new dimension of the complex system that links health literacy to health outcomes.

*Figure 1.1. Suggested Causal Pathways between Limited Health Literacy and Health Outcomes -*
*Source*: (Paasche-Orlow & Wolf, 2007)
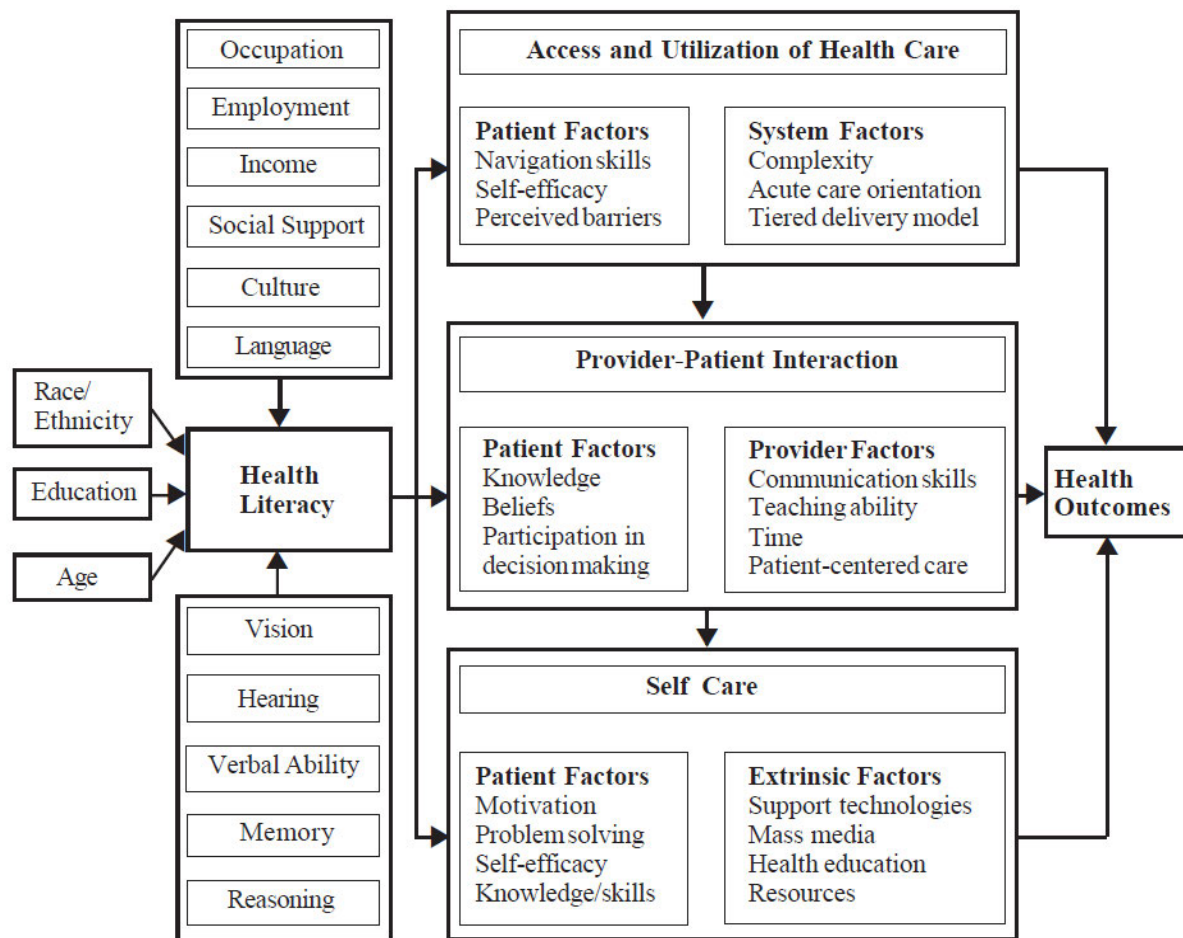


## 2.3 Mental Health Literacy

There has been an increasing effort to study some dimensions of individuals' mental health literacy (MHL). Mental Health Literacy was introduced to the literature in 1997 and was defined as the "knowledge and beliefs about mental disorders, which aid their recognition, management or prevention" (Jorm et al., 1997). Vignette-based interviews were initially created to assess individuals' mental health knowledge and were ever since the most extensively used measure of MHL (O'Connor et al., 2014).

Even though Mental Health Literacy was defined as a multidimensional concept, the tools used to assess MHL lacked thorough assessments of the different aspects of MHL. Mental Health Literacy consist of the following factors: '(1) the ability to recognise specific disorders, (2) knowing how to seek mental health information, (3) knowledge of risk factors and causes, (4) knowledge of self-treatments, (5) knowledge of professional help available, and (6) attitudes that promote recognition and appropriate help-seeking' (O'Connor & Casey, 2015). However,

the most commonly assessed MHL elements are illness recognition and beliefs about intervention helpfulness only. There is also a lack of distinction between 'beliefs' and 'knowledge' of mental health, resulting in uncertainty regarding the contribution of each factor on patients' literacy levels, preferences and choices (O'Connor et al., 2014).

A practical limitation of the MHL measure for research is the lack of score-based measure that can potentially assess the 'level' of an individual's MHL and investigate the most significant attributes separately that can help improve MHL (O'Connor et al., 2014). Some recent studies have included quantitative measures that reflect Mental Health Literacy, but none are multidimensional. There are also concerns about the psychometric properties of these tools (O'Connor et al., 2014). While MHL tools provide some useful insights, they are limited in their use for decision-making (O'Connor et al., 2014).

### 2.3.1 HL vs. MHL

HL and MHL are not interchangeable. While MHL can identify recognition and beliefs of treatment helpfulness, an individual with mental ill health requires more to access and navigate the healthcare system. For instance, an individual can correctly identify the symptoms of depression (high MHL) but does not necessarily know how to find health care providers specialised in depression or find out which services they're entitled to (some dimensions of low HL).

In our study, health literacy was interacted with DCE attributes to identify whether or not health literacy impacts the preferences for these attributes. This could ultimately help researchers and policy makers understand the mechanisms through which health literacy influences treatment preferences and explain a new dimension of the complex system that links health literacy to health outcomes.

## 3. Methodology

### 3.1 DCE overview

DCEs are extensively used to understand patient preferences in the health care system, as they provide rich data for decision making and economic evaluation (Lancsar & Louviere, 2008). In this study, a DCE is used to explore treatment preferences for individuals who have been diagnosed with depression, and explore how these preferences are associated with individuals' health literacy (HL) profiles.

DCEs create hypothetical markets for goods and services that are described by a set of attributes (characteristics) and levels. A DCE allows inferences to be drawn about the relative importance

of each treatment attribute by observing the trade-offs that respondents make when choosing their preferred treatment. Based on the RUT, the choices that individuals make represent the goods or services that are expected to maximise their utility. This utility however, based on their preference for the product's attributes, rather than the product itself (Ride & Lancsar, 2016) and there is some random component to their observed choice.

The aim of our DCE was to observe trade-offs and assess the relative importance of depression treatment attributes. A DCE also allowed us to understand how HL profiles are associated with treatment preferences. Heterogeneity is further explored to better understand why patients value depression treatments differently. Observed heterogeneity is explored by interacting choices with health literacy clusters and gender and unobserved heterogeneity is accounted for in the mixed logit model.

## 3.2. DCE development

### 3.2.1. Choice context

DCEs create a hypothetical choice context in which respondents make decisions. There exist two groups of respondents in our study: (1) Patients who have been diagnosed with depression in the past five years and are currently receiving treatment, and (2) individuals who have been diagnosed with depression in the past five years and are currently not receiving treatment. 'Currently' receiving treatment was defined as an individual who received treatment in the past four weeks.

To accommodate for the differences between both groups, two DCE versions were developed. The DCE versions are identical in all aspects except for the: (1) choice context (imaginary scenario) and (2) DCE's third alternative (e.g., status quo vs. opt-out). The first group was allocated to DCE Version 1, and the second group was allocated to DCE Version 2.

The choice contexts differ as follows. For DCE Version 1, we first asked respondents to reflect on their current diagnosis and treatment experience. Then, we asked them to imagine their General Practitioner (GP) or specialist recommended three depression treatment options, including their current treatment (i.e., status quo). We asked them questions prior to them undertaking the DCE to ensure their status quo could be represented within the DCE as a third option.

For DCE Version 2, respondents were asked to imagine that they are currently receiving treatment and that they have moderate depression (e.g., little or no interest in doing things, feeling down, hopeless and tired, etc.) for several days of the week. These symptoms were

derived from the Patient Health Questionnaire (PHQ-9) symptom checklist (Kroenke et al., 2001). Respondents were also asked to imagine that their GP or specialist has recommended two treatment options, or they could alternatively choose not to receive any treatment (i.e., no treatment). Individuals in DCE 2 may not be currently receiving treatment due to several factors. These may include (but are not limited to): (1) recovering from depression, (2) lack of treatment adherence due to ineffective treatment (3) lack of medication adherence due to adverse side-effects (4) lack of treatment adherence due to physicians' behaviour (4) depression severity (5) never receiving treatment or (6) any other random component.

Details about the experimental design differences between both versions (i.e., status quo vs. opt-out alternatives) can be found in section 3.3.1.

### 3.2.2. Development of Attributes and Levels

The second step of the DCE development was choosing attributes and levels. If important attributes that affect choices are excluded from the study, omitted variable bias can result in unreliable results for decision-making (Coast et al., 2012). On the contrary, the inclusion of many attributes increases the complexity of the choice tasks, affecting respondents' cognitive burden and choices' reliability (Liu et al., 2019). We therefore chose the number and type of attributes by taking into account the 'real world' choices a person would face, the trade-offs between information that can be extracted from data, and the respondents' cognitive burden (Bridges et al., 2011; Lancsar & Louviere, 2008). Identifying attribute levels in a DCE is another important step, especially to specify the correct range (e.g., minimum value and maximum value) as it helps ensure that the choice tasks are realistic (Lancsar & Louviere, 2008).

Attributes and levels are commonly developed by reviewing the literature, interviewing experts, interviewing and surveying respondents, and conducting focus groups (Coast et al., 2012). In this study, attributes, levels, and attribute definitions were developed using a two-stage process. Stage 1 included deriving attributes and their levels from the literature. We reviewed all studies that used SP, such as DCEs or conjoint analysis in the context of depression (Dwight-Johnson et al., 2010; Lokkerbol et al., 2019; Morey et al., 2007; Ride & Lancsar, 2016). The number of attributes in a DCE varied anywhere between four and eight attributes (Coast & Horrocks, 2007). Seven attributes that can potentially answer our research question were derived from the literature. These attributes were: (1) treatment type, (2) out-of-pocket cost, (3) effectiveness, (4) waiting time, (5) number of visits, (6) adverse side-effects, and (7) treatment modality.

Pharmacotherapy side-effects were derived by reviewing quantitative and qualitative studies and reports that discuss the side-effects of anti-depressants or the trade-offs patients make between these side-effects (Bet et al., 2013; Gelenberg et al., 2010; Revicki & Wood, 1998; Wouters et al., 2014). These side-effects were then grouped into five main categories.

Attributes and levels were refined after consulting a clinical mental health expert. For instance, the number of visits were modified to include the exact number of sessions covered by Medicare using a Mental Health Treatment Plan (Jorm, 2018).

Stage 2 consisted of a pilot study, where 12 individuals undertook a pilot DCE and survey and then participated in a Zoom interview. Recruitment took place via Macquarie University newsletter (ThisWeek), social media channels (MUCHE Twitter) and flyers around Macquarie University campus. This stage helped translate technical language to lay terms and ensured that the wording of attributes, levels and definitions convey their intended meanings (Coast et al., 2012). Pilot respondents were adult individuals who had been diagnosed with depression in the past five years, regardless of whether they were receiving treatment. The questions mainly consisted of open-ended and multiple-choice questions about their understanding of attributes, accuracy of levels, understanding of definitions, choice task complexity, cognitive burden and survey length. Each respondent was given a $50 e-voucher for their participation.

### 3.2.3. Pilot results

The results of the pilot showed that treatment modality (e.g., whether the session with the GP/ specialist was delivered face-to-face or via tele-health) was relatively less important than other treatment attributes. While this was not empirically tested, a ranking question indicated that most respondents ranked treatment modality as the least important characteristic out of the seven attributes. To limit design complexity and cognitive burden within the DCE, treatment modality was removed from the final design. Complexity in experimental designs could result from including a large number attributes and/or levels, placing constraints on some attributes and using attribute interactions. The final DCE design consisted of six attributes in total.

The out-of-pocket cost's definition and levels were refined after the pilot stage. Individuals who received a combination treatment of anti-depressants and psychotherapy reported that it was not clear whether this included the total out-of-pocket cost for both treatments combined. The definition was therefore refined to convey that the cost attribute represented the total out-of-pocket cost for both treatments. Some respondents indicated that their psychotherapy treatments were fully bulk-billed (e.g., total cost of treatment was fully covered by the publicly-

funded health insurance in Australia, Medicare), while others indicated that they pay up to $350 per week if they consulted a psychiatrist. The lower and upper bound levels were therefore modified to include these suggestions.

Pilot results also indicated that individuals preferred the levels of effectiveness to be indicated as a population average (e.g., 55 out of 100 people are expected to report significant levels of symptom improvement), rather than a percentage of symptoms improvement (e.g., you have a 55% chance of your symptoms improving). Respondents reported that it was difficult to conceptualise what symptom improvement in percentage terms meant. Respondents also reported that the effectiveness level visual made it easier to understand the definition of the attribute (see **Figure 3.1 and Figure 3.2**). This is also supported by research that suggests that visual representations can be easier to understand than written text, and can lead to lower levels of cognitive burden (Murwirapachena & Dikgang, 2021).

Waiting time initially referred to how long the patient had to wait after diagnosis until a treatment was received. Respondents explained that being depressed resulted in an increased waiting time not necessarily because the specialist wasn't available, but because they chose to delay seeking help due to their distress levels. Therefore, the final waiting time definition indicated how long patients had to wait after their diagnosis until the specialist was '*available*' to start their treatment.

Other minor modifications were made based on pilot respondent feedback to ensure all attributes, levels and definitions were clearly defined and that they convey the intended meaning. The pilot interviews revealed that there was a great focus on out-of-pocket costs, effectiveness and side-effects when choosing between alternatives. In an open-ended question about the difficulty of choices and length of the survey, pilot respondents generally indicated that they found the DCE task relatively easy to undertake and that it provided just the right amount of information. **Table 3.1** summarises the attributes, definitions and levels of the DCE included in the final design.

*Figure 3.1. Example of choice task - DCE Version 1*

| | Treatment A | Treatment B | Current Treatment |
|---|---|---|---|
| **Effectiveness** | 15 people for every 100 treated | 40 people for every 100 treated | 60 people for every 100 treated |
| **Out-of-pocket Cost** | $10 per week | $350 per week | $120 per week |
| **Waiting Time** | 1 month | 3 months | No waiting time (Immediate start) |
| **Treatment Type** | Combination Treatment (Anti-depressant medication and Psychotherapy) | Combination Treatment (Anti-depressant medication and Psychotherapy) | Combination treatment (e.g., anti-depressant medication and psychotherapy) |
| **Adverse Side-effects** | Sleep Disturbances (e.g., Insomnia) | Fatigue/ Tiredness | Sexual dysfunction (e.g., inability to orgasm, loss of libido) |
| **Number of Visits** | 4 visits | 16 visits or more | 16 visit(s) |
| **Please choose your most preferred (best) treatment amongst all three options** | ○ | ○ | ○ |
| **Please choose your least preferred (worst) treatment amongst all three options** | ○ | ○ | ○ |

*Figure 3.2. Example of choice task - DCE Version 2*

| | Treatment A | Treatment B | No Treatment |
|---|---|---|---|
| **Number of Visits** | 4 visits | 10 visits | No Treatment |
| **Waiting Time** | No waiting time (Immediate start) | 1 month | |
| **Treatment Type** | Psychotherapy (e.g., talking to a psychologist or psychiatrist) | Combination Treatment (anti-depressant medication and Psychotherapy) | |
| **Effectiveness** | 15 people for every 100 treated | 55 people for every 100 treated | |
| **Out-of-pocket Cost** | $0 per week | $30 per week | |
| **Adverse Side-effects** | No side-effects | Sleep Disturbances (e.g., Insomnia) | |
| **Please choose your most preferred (best) option among all options** | ○ | ○ | ○ |
| **Please choose your least preferred (worst) option among all options** | ○ | ○ | ○ |

*Table 3.1. DCE attributes, definitions and levels*

| Attributes | Definitions | Levels |
|---|---|---|
| **Treatment type** | The type of treatment that you choose to treat your depression | Anti-depressant medication *(reference)* |
| | | Psychotherapy (e.g., talking to a therapist or psychiatrist) |
| | | Combination treatment (e.g., pharmacotherapy & psychotherapy) |
| **Out-of-pocket cost** | The total out-of-pocket amount that you have to pay per week for your treatment. | $0 per week (for your treatment duration) *(reference)* |
| | | $2 per week (for your treatment duration) |
| | | $10 per week (for your treatment duration) |
| | | $30 per week (for your treatment duration) |
| | | $80 per week (for your treatment duration) |
| | | $150 per week (for your treatment duration) |
| | | $350 per week (for your treatment duration) |
| **Effectiveness** | The number of people out of 100 who are expected to report significant levels of symptom improvement | 15 people for every 100 people treated *(reference)* |
| | | 40 people for every 100 people treated |
| | | 55 people for every 100 people treated |
| | | 75 people for every 100 people treated |
| **Waiting time** | How long you have to wait after your diagnosis until your specialist is available to start your treatment | No waiting time *(reference)* |
| | | 2 weeks |
| | | 1 month |
| | | 3 months |
| **Number of visits** | How many times you visit your health specialist during the course of your treatment. | Only one visit (upon assessment) *(reference)* |
| | | Four visits (1 visit per week) |
| | | Ten visits (1 visit per week) |
| | | Sixteen visits or more (1 visit per week) |
| **Adverse side-effects** | The most distressing side-effect that you may experience as a result of your treatment | No side-effects *(reference)* |
| | | Sexual dysfunction (e.g., inability to orgasm, loss of libido) |
| | | Weight gain/ increased appetite |
| | | Gastrointestinal side-effects (e.g., (e.g., Nausea, vomiting, diarrhea, abdominal pain) |
| | | Sleep Disturbances (e.g., Insomnia) |
| | | Fatigue/ tiredness |

## 3.3 Experimental Design

### 3.3.1. Choice Sets

The DCE was created using the Ngene software (Choice Metrics, Version 1.1.1). Each choice set included three alternatives – Treatment A, Treatment B, and current treatment (version 1) or no treatment (version 2). For those currently receiving treatment, a status-quo alternative was included to better understand their trade-offs with their current treatment. Current treatment information was collected at the beginning of the survey, before commencing the DCE task. Respondent answers appeared in the status quo alternative within each choice scenario, except for treatment effectiveness. Given that patients are currently still receiving treatment, it was considered unrealistic to assume that they know their treatment's effectiveness rates. Instead, the survey was programmed to create an effectiveness level depending on the treatment type they were currently undertaking at the time of the survey. For pharmacotherapy and psychotherapy treatment types, effectiveness was reported as '"50 out of 100 people are expected to report significant levels of symptom improvement". For a combination of pharmacotherapy and psychotherapy treatment, effectiveness was reported as "75 out of 100 people are expected to report significant levels of symptom improvement". These estimates are in line with recent studies that show a combination treatment is relatively more effective than a single treatment of antidepressants or psychotherapy alone (Cuijpers et al., 2014).

We did not force respondents to choose in the DCE because it would have stopped respondents from choosing to not seek treatment (Lancsar & Louviere, 2008). While forced choice could increase the amount of information collected by the DCE and is realistic when individuals are forced to make choices in real life, the implications for this study would be that respondents might have been forced to choose a treatment alternative that is unappealing in real settings. This might cause the results to be overestimated (Determann et al., 2019). Statistical bias can arise from a number of reasons, including over-estimation or under-estimation (Piedmont et al., 2000).

In our study, people with low levels of health literacy might face difficulties in comprehending prescription information and accessing and engaging with the healthcare providers (Lincoln et al., 2015). These patients might choose not to receive any treatment at all. Poor understanding and lack of awareness about mental health issues could also leave many patients at the risk of delayed treatment or no treatment at all (Tay et al., 2018). Therefore, allowing respondents to opt-out in the DCE was considered essential to understanding the value respondents placed on attributes.

There has been some recommendation to include both an opt-out and a status quo alternative in a choice scenario, where a status quo is available (Determann et al., 2019). Since respondents in our study have already chosen to receive treatment in real life (over no treatment), including both an opt-out and a status quo option was unrealistic.

Having a status quo in DCE Version 1 (for those currently receiving treatment) and an opt-out option in DCE Version 2 (for those not currently receiving treatment) ensured our DCE reflected the real choices made by individuals when seeking treatment for depression.

The attributes and levels of "Treatment A" and "Treatment B" were identical in both DCE versions but changed across each scenario. The description of "Current Treatment" remained the same throughout each scenario for each respondent (DCE Version 1). The description of "No Treatment" remained the same throughout each scenario for each respondent (DCE Version 2). See **Figure 3.1** and **Figure 3.2**.

### 3.3.2 Best-Worst Scaling (BWS)

DCEs are generally used to elicit individuals' most preferred options. The Best-Worst Scaling was developed by Finn and Louviere (1992). It is a choice experiment that asks respondents to choose both their best and worst alternatives. There are three types of Best-Worst Scaling (BWS) (Flynn & Marley, 2014). In this study, the multi-profile case (Case 3) was used, where respondents were asked to choose their most preferred and least preferred alternative in every choice task of the DCE. See **Figure 3.1** and **Figure 3.2**.

### 3.3.3. D-efficiency

The experimental design in a DCE creates choice alternatives depending on all possible combinations of attributes and levels. For instance, if there are X attributes and each attribute has Y levels, a full-factorial design results in $Y^x$ profiles (Lancsar & Louviere, 2008).

The number of attributes and levels in this DCE ($4^3 * 3^1 * 7^1 * 6^1$) resulted in 8,064 combinations. This indicates an extremely large number of choice tasks per person for full-factorial design (F. R. Johnson et al., 2013). Therefore, Ngene was used to generate an efficient design that maximises D-efficiency (also known as D-optimality) (Liu et al., 2019). D-efficiency is typically the most popular efficiency metric used in the efficient design of DCEs (F. R. Johnson et al., 2013). To calculate the efficiency of an experimental design, the matrix of the optimal design (C $_{optimal}$) should be known (Louviere et al., 2008). D-efficiency can be calculated as follows:

[det (C)/ det (C $_{optimal}$)]$^{1/p}$

where p is the number of estimates to be calculated and C is a given matrix. D-efficient design ensures that the parameters generated have the lowest standard errors possible (Metrics, 2012).

The design resulted in 36 rows, which were further divided into 3 versions. Each individual was randomly allocated 12 choice tasks. An example of a choice task is shown in **Figure 3.1** and **Figure 3.2**.

### 3.3.4. DCE choice task design

Similar to the work of Katz et al. (2018) and Laver et al. (2011), a warm-up scenario was added at the beginning of the DCE to familiarise the respondents with DCE tasks and help them understand the layout and trade-offs of the stated preference. An additional choice task with a dominant treatment option was added at the end of the DCE to identify whether respondents were trading-off and choosing their most and least preferred alternatives logically and consistently. This internal validity check is referred to as 'within-set dominated pairs', where all the attributes of one alternative evidently dominate the attributes of the other alternative (Johnson et al., 2019).

Studies suggest that non-randomisation of attribute order could result in order biases (Chrzan, 1994). Therefore, the order of attributes was random in each choice task, to make sure that respondents were not only paying attention to the attributes that always appear in the same location (e.g., on top).

### 3.3.5. Constraints

Constraints were included in the design to ensure that all choice alternatives were plausible (Lancsar & Louviere, 2008). For instance, for an alternative where the treatment type is anti-depressants, the out-of-pocket cost was constrained between $2 and $30 per week. Australians are generally required a co-payment for their prescribed medications (Lee et al., 2017). For the average citizen, the estimated co-payment per month is around $37 (Lee et al., 2017). The out-of-pocket costs spent on medication could be higher for some drugs, higher dosages or if individuals have multiple prescriptions. Nevertheless, when the treatment type was a combination of psychotherapy and anti-depressants, the cost could range anywhere between $2 and $350 per week. Similarly, none of the side-effects listed in Table 1 appeared in an alternative where the treatment type is psychotherapy. These side-effects are only experienced when an individual is taking anti-depressants. A list of all constraints is provided in **Table 3.2**. Applying these constraints led to an attribute level imbalanced design, meaning that attribute levels do not appear the same number of times per respondent. It is almost impossible to find

a level balance in design where constraints are imposed (Metrics, 2012). Therefore, all attribute levels appeared at least once per design block, to ensure trade-offs across all levels are being considered by each respondent.

*Table 3.2. List of constraints*

These combinations will <u>never</u> appear in the same alternative

| Treatment Type | Levels excluded from the design for each corresponding treatment type |
|---|---|
| Anti-depressants | **Out-of-pocket cost**<br>$0<br>$80<br>$150<br>$350 |
| | **Waiting time**<br>2 weeks<br>1 month<br>3 months |
| | **Number of visits**<br>10 visits<br>16 visits |
| Psychotherapy | **Number of visits**<br>1 visit |
| | **Adverse side-effects**<br>Sexual dysfunction (e.g., inability to orgasm, loss of libido)<br>Weight gain/ increased appetite<br>Gastrointestinal side-effects (e.g., (e.g., Nausea, vomiting, diarrhea, abdominal pain)<br>Sleep Disturbances (e.g., Insomnia)<br>Fatigue/ tiredness |
| Combination Treatment (anti-depressant and psychotherapy) | **Out-of-pocket cost**<br>$0 |
| | **Number of visits**<br>1 visit |

## 3.4. DCE Implementation

### 3.4.1. Recruitment and Participation

Screening questions were included at the beginning of the survey to ensure only those aligned with our inclusion criteria participated. These criteria included: (1) be at least 18 years of age, (2) have been diagnosed with depression by a specialist or GP in the past 5 years, and (3) have a Medicare card.

People not clinically diagnosed with depression were excluded. While feeling depressed is not a mental illness and usually associated with temporary feelings of sadness (e.g., due to loss), being diagnosed with depression is a mental illness associated with more chronic and disruptive

symptoms (Leventhal, 2008). The latter could include symptoms such as continuously feeling like a failure and having suicidal thoughts (Kroenke et al., 2001). Making choices repetitively when completing a DCE is a complex task, requiring researchers to consider how much knowledge and experience individuals have when completing the survey (Lancsar & Louviere, 2008). To avoid inaccurate assumptions about depression treatments and the mental health experience in Australia, only those who are currently or previously clinically diagnosed with depression were eligible to participate. These individuals have experienced depression first-hand and thus may better understand ramifications from the choices and trade-offs they are asked to make.

The health care system in Australia is complex, consisting of Medicare subsidised services and privately insured services (Leach et al., 2012). In 2017, around 25 million Australians were eligible for Medicare (Shergold et al., 2017). These include Australian citizens, permanent residents, and some visa holders. Temporary Australian residents, such as students and temporary work visa holders, are not eligible to have a Medicare card and are only covered by private health insurance. The out-of-pocket costs and health care experience could substantially vary between the two groups. Therefore, only individuals who are covered by Medicare were eligible to undertake this study.

The data were collected in Australia between July and November 2021. Respondents were recruited via an online panel company – Octopus Group - who had a pool of respondents with mental health conditions. Mental health organisations' also recruited respondents through advertisements on social media, mailing lists and/or newsletters. We recruited mental health organisations to advertise our survey, giving us targeted access to relevant respondents. These organisations included Beyond Blue, the Black Dog Institute, Mind Spot, Headspace and This Way up. Around 5% of respondents were recruited via mental health organisations. The rest of the individuals were recruited via the online panel.

### 3.4.2. Internal Validity
Respondents who completed all mandatory survey questions entered a draw to win one of three $200 e-vouchers. The e-voucher draw applied to everyone who completed the survey. The most cost-effective incentive to maximise survey participation is few, large pay-offs (Conn et al., 2019; Gajic et al., 2012).

In addition to the screening questions, other quality controls were introduced. The quality controls consisted of the following: (1) DCE within-set dominated pairs and a (2) non-DCE

repeated question. Individuals who chose the dominated alternative as their most preferred treatment failed the DCE dominance test. Also, respondents who answered the repeated question inconsistently (e.g., agree in question 1 and disagree in question 2) failed the repeated question consistency test. Respondents who failed either of these quality checks were excluded from the final analysis. To ensure an appropriate sample size, a second round of data collection was done to replace the respondents who failed these quality checks. These quality checks are similar to those employed by Gajic et. al (2012) to test the consistency of responses in stated preference (SP) surveys.

### 3.4.4. Sample Size

One commonly used method for sample size calculation in DCEs is the rule of thumb proposed by Johnson and Orme (2003). Sample size requirements for a design that includes interactions will depend on number of choice tasks, number of alternatives and the product of the number of levels of the interacted attributes (F. R. Johnson et al., 2013). Applying this rule of thumb suggests that each DCE version required a minimum of 70 respondents. Instead, we recruited around 500 respondents for each DCE version to ensure a high statistical power, to measure preference heterogeneity, and to compensate for reduced design efficiency from imposing constraints (F. R. Johnson et al., 2013). A detailed description of the final sample composition is presented in the 'Results' section.

### 3.4.5. Survey Development

The study was approved by Macquarie University Human Research Ethics Committee HREC, Humanities & Social Sciences Committee, Reference No:52021984428002.

The survey was administered as an anonymous web-based survey and consisted of 5 sections. The first section included background information about the attributes and their definitions. Individuals were also asked about their current or previous treatments, if applicable. Each respondent completed the 'warm-up' task in addition to the 12 choice tasks consisting of 3 alternatives. The DCE section ended with a 'rationality test' to ensure data quality validation. The following sections consisted of demographic, health literacy and mental health treatment beliefs questions (see **Appendix 1**).

# 4. Econometric Modelling

## 4.1 Overview

In this study, the conditional logit models and mixed logit models were estimated, using STATA (Version 16). These models can be interpreted via the Random Utility Theory which assumes that individuals will choose the alternative that provides them with the highest utility.

The utility an individual n obtains from choosing an alternative j can be written as:

$$U_{nj} = V_{nj} + \varepsilon_{nj}$$

where $V_{nj}$ is the deterministic component of utility that depends on the attributes and the individual characteristics of decision makers. $\varepsilon_{nj}$ is a random component (that accounts for unobserved characteristics).

## 4.2 Conditional Logit Model

When the random error $\varepsilon_{nj}$ are independently and identically distributed (*iid*) as extreme value type 1, the model is the conditional logit (McFadden, 1973). In our study, this model was used as a baseline model to estimate utility functions.

The conditional logit model assumes the Independence of Irrelevant Alternatives (IIA). IIA implies that the choice between two options only depends on the characteristics of these two options, irrespective of the addition of new alternatives (Train, 2009). The IIA raises concerns over model specification when there are significant substitution patterns between the alternatives of a given choice set, indicating that the error term could be correlated over alternatives. Moreover, the model identifies the utility of choosing an alternative without taking into account unobserved, random variations in taste. It assumes that preference weights are fixed across individuals and that that there is no correlation over repeated choices made by the decision maker (Train, 2009).

The conditional logit model is estimated with maximum likelihood estimation (MLE). MLE is one of the most popular statistical inference methods that aims to estimate parameters that produce the highest likelihood for a model.

## 4.3 Mixed Logit Model (MIXL)

More advanced models have been developed to overcome the limitations of the conditional logit model, including the mixed logit models (MIXL). MIXL allows preference weights to be random to allow for preference heterogeneity across individuals. This specification also allows

for unrestricted substitution patterns (and thus removes the IIA assumption) (Train, 2009). This model is also referred to as random-parameters logit.

In this case, the utility of an individual n choosing alternative j in choice set s is represented by:

$$U_{njs} = \beta'_n X_{njs} + \varepsilon_{njs}$$

where $\beta'_n$ is vector of random coefficients, distributed with density $f(\beta n|\theta)$ where $\theta$ represents the parameters of the chosen distribution to be estimated. In the case of normal distributions, the parameters include the mean and standard deviation.

The MIXL model does not have a closed form likelihood function and is typically estimated using simulation methods, including the maximum simulated likelihood estimation (MSLE) and Hierarchical Bayesian Modelling (Train, 2009). We adopted the former and undertook the estimation using – MIXLOGIT-, a Stata module developed by Hole (2007). A thousand Halton draws were used in the simulation of the likelihood.

It is common practice to specify the distribution of preferences to be normal in a mixed logit model. This means that tastes could be both positive or negative. However, some preferences are not expected to follow this distribution. For instance, people would always prefer lower treatment costs and higher effectiveness. This implies the importance of imposing sign constraints on these preference distributions. In this study, the coefficients of cost and effectiveness were assumed to follow a log-normal distribution. Cost was converted to being negative to ensure a negative coefficient. All other mixing distributions were assumed to be normal.

## 4.4 Sub-group Analyses

To explore observed heterogeneity, sub-group analysis was undertaken by interacting the preference weights with (a) health literacy clusters and (b) gender. Instead of estimating main effects and interaction effects, we directly estimated the effects for each sub-group, similar to what was adopted in (Lancsar et al., 2020).

## 4.5 Willingness to Pay (WTP)

One of the key results for a DCE study is the Willingness to Pay (WTP), which is the dollar amount individuals are willing to pay to move from one attribute level to another. While it is possible to estimate WTP using the preference space model, such estimates are often subject to biases(Hensher & Greene, 2003). We therefore adopted the WTP space model which allows

us to specify the distributions of WTP directly (Train & Weeks, 2005). The preference space and WTP space models have different implications on the preference weights, and while WTP space models could provide a more realistic distribution of WTP, preference space models may fit the data better (Hole & Kolstad, 2012).

## 4.6 Relative Importance

Another key result of a DCE study is its ability to evaluate the size of relative importance for each attribute (Lancsar et al., 2007). Relative importance of attributes represents the relative impact an attribute has on choice. Relative importance was calculated using the range method, subtracting the highest utility from the lowest utility of an attribute level, and dividing it but the sum of all attribute differences (Lancsar et al., 2007).

# 5. Results

## 5.1 Respondents' Characteristics

A total of 1,015 individuals completed the survey. Based on the screening questions, 514 respondents were allocated to DCE 1 and 501 were allocated to DCE 2. We excluded respondents who failed the dominance test: 19 for DCE 1 and 9 for DCE 2. We also excluded those who answered the repeated question inconsistently: 29 for DCE 1 and 24 for DCE 2. One 'extreme speeder' from each DCE version was excluded from the final analysis (i.e., survey duration time < 4.5 minutes).

The final sample of DCE 1 consisted of 484 respondents: 327 females (67.56%), 143 males (29.55%) and 14 non-binary (2.89%). Mean age is 31.82 years (SD=9.91), ranging between 18 and 71. Education levels for this sample are almost equally distributed between high school degree or below (31.40%), TAFE or other certificates/ diplomas (32.44%) and bachelor or postgraduate degrees (36.16%). 45% of the sample is in the low-income bracket (below $40,000 per year), while only 25% earns $125,000 p.a. or more. 29.12% are unemployed or out of the labour force, and 39.46% of the sample works full-time.

The final sample of DCE 2 consisted of 476 respondents. Most of the sample is female (66.6%) and only one individual identified as non-binary. Similar to DCE 1, most individuals are middle income earners, with an average age of 31.37 (SD=9.64). Sample statistics for both DCEs are presented in **Table 5.1**.

Chi-squared tests were used to identify any statistical difference between both samples. The results of the chi-squared tests can be found in **Appendix 2.1**. The distribution of employment

(p-value=0.01), ethnicity (p-value=0.04) and gender (p-value=0.01) are statistically different between DCE 1 and DCE 2. The majority of people in DCE 1 are full-time employees, while the majority in DCE 2 are part-time employees. Fourteen respondents (2.89%) identified themselves as non-binary in DCE 1 while only one (0.21%) in DCE 2 did so. DCE 2 are more culturally diverse than DCE 1.

Apart from the sampling variation, a potential explanation for these differences between the two samples is the screening process. Respondents in DCE1 were receiving treatment for depression, while respondents in DCE 2 were not receiving any treatment for depression.

*Table 5.1. Respondents' Characteristics - DCE 1 & DCE 2*

| | DCE 1 | | | DCE 2 | |
|---|---|---|---|---|---|
| | **Freq** | **Percent** | | **Freq** | **Percent** |
| **Gender** | | | **Gender** | | |
| Male | 143 | 29.55 | Male | 158 | 33.19 |
| Female | 327 | 67.56 | Female | 317 | 66.6 |
| Non-binary | 14 | 2.89 | Non-binary | 1 | 0.21 |
| Total | 484 | 100 | Total | 476 | 100 |
| **Ethnicity** | | | **Ethnicity** | | |
| Australian | 392 | 84.12 | Australian | 360 | 78.95 |
| Non-Australian | 74 | 15.88 | Non-Australian | 96 | 21.05 |
| Total | 466 | 100 | Total | 456 | 100 |
| **Education** | | | **Education** | | |
| High-school or below | 152 | 31.4 | High-school or below | 145 | 30.46 |
| Diplomnas/ Certificates | 157 | 32.44 | Diplomnas/ Certificates | 177 | 37.18 |
| University Degree | 175 | 36.16 | University Degree | 154 | 32.35 |
| Total | 484 | 100 | Total | 476 | 100 |
| **Employment** | | | **Employment** | | |
| Full-time | 191 | 39.46 | Full-time | 202 | 42.44 |
| Part-time | 152 | 31.4 | Part-time | 260 | 54.62 |
| Not employed | 141 | 29.13 | Not employed | 14 | 2.94 |
| Total | 484 | 100 | Total | 476 | 100 |
| **Income** | | | **Income** | | |
| Low | 220 | 45.45 | Low | 201 | 42.23 |
| Middle | 239 | 49.38 | Middle | 175 | 36.76 |
| High | 25 | 5.17 | High | 100 | 21.01 |
| Total | 484 | 100 | Total | 476 | 100 |

| **Age** | **Min** | **Mean** | **Age** | **Min** | **Mean** |
|---|---|---|---|---|---|
| | 18 | 31.822 | | 18 | 31.374 |
| | **Max** | **SD** | | **Max** | **SD** |
| | 71 | 9.916 | | 75 | 9.643 |

Freq: Frequency

Note: DCE 1 includes respondents currently receiving treatment – DCE 2 includes respondents not currently receiving treatment

## 5.2 Clustering respondents based on health literacy

As the HLQ measured health literacy across nine domains, we sought to cluster respondents into health literacy 'groups' to assess the relationship between health literacy and preferences. We identified 'patterns' of health literacy strengths and weaknesses by grouping people who have similar health literacy profiles in the same cluster (Batterham et al., 2014).

We employed hierarchical cluster analysis (Ward's method) (Batterham et al., 2014) to divide both samples into 3 clusters. Cluster results are shown in **Tables 5.2 and 5.3**. The highlighted scores of each of the nine domains follow the traffic light system of colouring. This is recommended by the Ophelia process (Batterham et al., 2014). Shades of green represent higher health literacy scores (and higher health literacy), shades of yellow represent moderate scores, and shades of red represent lower scores. The HLQ was described in the background section of this thesis. The nine domains of the HLQ are represented as mean scores at 95% confidence interval (Batterham et al., 2014).

*Table 5.2. Health Literacy Cluster Solution - DCE 1*

| Cluster | | | 1 | 2 | 3 |
|---|---|---|---|---|---|
| **Overall health literacy score** | | | High | Moderate | Low |
| Number of respondents | | | 103 | 327 | 54 |
| % in sample | | | 21% | 68% | 11% |
| Overall average score | | | 3.7831 | 3.1847 | 2.4432 |
| 1. Feeling understood and supported by healthcare providers | | | 3.75 | 3.05 | 2.42 |
| 2. Having sufficient information to manage my health | | Range: 1 (lowest) - 4 (highest) | 3.37 | 2.80 | 2.19 |
| 3. Actively managing my health | | | 3.32 | 2.78 | 2.27 |
| 4. Social support for health | **Mean Score** | | 3.29 | 2.69 | 2.23 |
| 5. Appraisal of health information | | | 3.41 | 2.78 | 2.37 |
| 6. Ability to actively engage with healthcare providers | | | 4.21 | 3.50 | 2.43 |
| 7. Navigating the healthcare system | | Range: 1 (lowest) - 5 (highest) | 3.99 | 3.35 | 2.36 |
| 8. Ability to find good health information | | | 4.23 | 3.68 | 2.73 |
| 9. Understand health information well enough to know what to do | | | 4.34 | 3.90 | 2.95 |
| 1. Feeling understood and supported by healthcare providers | | | 0.31 | 0.47 | 0.58 |
| 2. Having sufficient information to manage my health | | | 0.36 | 0.36 | 0.43 |
| 3. Actively managing my health | | | 0.46 | 0.45 | 0.50 |
| 4. Social support for health | | | 0.42 | 0.47 | 0.54 |
| 5. Appraisal of health information | **Standard Deviation** | | 0.33 | 0.39 | 0.52 |
| 6. Ability to actively engage with healthcare providers | | | 0.54 | 0.58 | 0.55 |
| 7. Navigating the healthcare system | | | 0.51 | 0.48 | 0.54 |
| 8. Ability to find good health information | | | 0.43 | 0.45 | 0.59 |
| 9. Understand health information well enough to know what to do | | | 0.47 | 0.45 | 0.66 |

Range 1-4: 1= strongly disagree, 2 = disagree, 3 = agree, 4 = strongly agree
Range 1-5: 1 = cannot do or usually difficult, 2 = very difficult, 3 = quite difficult, 4 = easy, 5 = very easy

*Table 5.3. Health Literacy Cluster Solution - DCE 2*

| Cluster | | | 1 | 2 | 3 |
|---|---|---|---|---|---|
| **Overall health literacy score** | | | **High** | **Moderate** | **Low** |
| Number of respondents | | | 235 | 162 | 79 |
| % in sample | | | 50% | 35% | 17% |
| Overall average Score | | | 3.5289 | 3.0417 | 2 5345 |
| 1. Feeling understood and supported by healthcare providers | **Mean Score** | **Range: 1 (lowest) - 4 (highest)** | 3 23 | 2.79 | 2.28 |
| 2. Having sufficient information to manage my health | | | 3.14 | 2.75 | 2.18 |
| 3. Actively managing my health | | | 2 98 | 2.70 | 2.29 |
| 4. Social support for health | | | 3.08 | 2.61 | 2.24 |
| 5. Appraisal of health information | | | 3.03 | 2.64 | 2.48 |
| 6. Ability to actively engage with healthcare providers | | **Range: 1 (lowest) - 5 (highest)** | 3 99 | 3.30 | 2.48 |
| 7. Navigating the healthcare system | | | 3 86 | 3.16 | 2.50 |
| 8. Ability to find good health information | | | 4.05 | 3.52 | 2.96 |
| 9. Understand health information well enough to know what to do | | | 4 21 | 3.78 | 3.27 |
| 1. Feeling understood and supported by healthcare providers | **Standard Deviation** | | 0.47 | 0.51 | 0.64 |
| 2. Having sufficient information to manage my health | | | 0 36 | 0.37 | 0.41 |
| 3. Actively managing my health | | | 0 51 | 0.49 | 0.54 |
| 4. Social support for health | | | 0.48 | 0.47 | 0.56 |
| 5. Appraisal of health information | | | 0.45 | 0.45 | 0.44 |
| 6. Ability to actively engage with healthcare providers | | | 0.44 | 0.48 | 0.54 |
| 7. Navigating the healthcare system | | | 0 38 | 0.37 | 0.48 |
| 8. Ability to find good health information | | | 0 38 | 0.40 | 0.45 |
| 9. Understand health information well enough to know what to do | | | 0.47 | 0.43 | 0.52 |

Range 1-4: 1= strongly disagree, 2 = disagree, 3 = agree, 4 = strongly agree
Range 1-5: 1 = cannot do or usually difficult, 2 = very difficult, 3 = quite difficult, 4 = easy, 5 = very easy

Individuals allocated to cluster 1 in DCE 1 have overall high health literacy levels in all 9 HLQ domains, with relatively lower scores for social support and navigating the health care system. This implies that even though individuals in cluster 1 are highly health literate, they still face some challenges in these two health literacy domains. Cluster 2 exhibits the same patterns of cluster 1, with overall lower score on all the 9 domains. Cluster 3 includes individuals who scored relatively low on all health literacy domains, with particular weaknesses in the following domains: (a) ability to actively engage with health care providers and (b) navigating the health care system. While this cluster has significant weaknesses in all 9 domains, individuals in cluster 3 are the only group to have slightly less difficulty in the appraisal of health information. This cluster also has slightly higher score on feeling understood and supported by health care providers and understanding health information well enough to know what to do.

The health literacy pattens across clusters in DCE 2 are like those in DCE 1, except Cluster 1. Cluster 1 in DCE 2 exhibits an additional strength in individuals' ability to find good health information. This cluster has also relatively weaker ability to actively manage their health and

in the appraisal of health information. These two health literacy domains weaknesses are unique to those in cluster 1 of DCE 2. Clusters 2 and 3 are very similar across both DCEs, with the sample in cluster 3 of DCE 2 having one less strength than those in cluster 3 of DCE 1 (i.e., appraisal of health information). **Table 5.4** summarises the strengths and weaknesses of each cluster of both DCEs.

In DCE 1, 68% of individuals were allocated to cluster 2 (moderate health literacy patterns). The second largest group is cluster 1, which includes 103 individuals (21%), while the low health literacy cluster is the smallest, including 54 individuals (11%) only. The standard deviations of each health literacy scale are generally below 0.6, which is recommended by the Ophelia process (Batterham et al., 2014).

Contrary to DCE 1, the largest cluster in DCE 2 is the overall high health literacy cluster, including 235 (out of 476) individuals. The second largest cluster is cluster 2 (moderate health literacy profile). Similar to the cluster results of DCE 1, the smallest cluster is the one with overall lower health literacy patterns. Almost all standard deviations of the 9 scales are also below 0.6 in this sample.

Descriptive statistics for DCE 2 show that cluster 1 includes mostly females (67.9%), middle income earners (48.5%), moderate to high educated individuals (only 22.3% have high-school degree or less), and full-time workers (36.8%). Clusters 2 and 3 include individuals with overall lower educational levels and lower income comparted to Cluster 1. Cluster 3 (low overall health literacy scores) consists of 63.29% of females and includes 54.4% of low-income earners. Cluster 1 (higher overall health literacy scores) has more middle-income earners, individuals with higher education levels and more full-time employed individuals, relative to clusters 2 and 3. Demographics for both DCEs across clusters can be found in **Table 5.5**.

*Table 5.4. Health Literacy Patterns Summary - DCE 1 & DCE 2*

| | DCE 1 | | |
|---|---|---|---|
| | **Cluster 1** | **Cluster 2** | **Cluster 3** |
| **Overall health literacy patterns** | High health literacy in all 9 domains | Moderate health literacy in all 9 domains | Low health literacy in all 9 domains |
| **Strengths** | 1. Feeling understood and supported by healthcare providers | 1. Feeling understood and supported by healthcare providers | 1. Feeling understood and supported by healthcare providers |
| | | | 5. Appraisal of health information |
| | 9. Understand health information well enough to know what to do | 9. Understand health information well enough to know what to do | 9. Understand health information well enough to know what to do |
| **Weaknesses** | 4. Social support for health | 4. Social support for health | 6. Ability to actively engage with healthcare providers |
| | 7. Navigating the healthcare system | 7. Navigating the healthcare system | 7. Navigating the healthcare system |
| | DCE 2 | | |
| | **Cluster 1** | **Cluster 2** | **Cluster 3** |
| **Overall health literacy patterns** | High health literacy in all 9 domains | Moderate health literacy in all 9 domains | Low health literacy in all 9 domains |
| **Strenghts** | 1. Feeling understood and supported by healthcare providers | 1. Feeling understood and supported by healthcare providers | 5. Appraisal of health information |
| | 8. Ability to find good health information | | |
| | 9. Understand health information well enough to know what to do | 9. Understand health information well enough to know what to do | 9. Understand health information well enough to know what to do |
| **Weaknesses** | 3. Actively managing my health | 4. Social support for health | 6. Ability to actively engage with healthcare providers |
| | 5. Appraisal of health information | 7. Navigating the healthcare system | 7. Navigating the healthcare system |

*Table 5.5. Respondents' Characteristics per Cluster - DCE 1 & DCE 2*

| | | DCE1 | | | | | | | | | | | | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | | Socio-demographics | | | | | | | | | | | | | | | | | | | | |
| | Gender | | | | Ethnicity | | | Education | | | | Employment | | | | Income | | | | Age | |
| Cluster | Male | Female | Non-binary | Total | Australian | Non-australian | Total | High-school or less | Diploma/certificate | University degree | Total | Full-time | Part-time | Not employed | Total | Low | Middle | High | Total | Mean | SD |
| 1 | 31 30.1% | 70 68.0% | 2 1.9% | 103 100.0% | 87 87.0% | 13 13.0% | 100 100.0% | 23 22.3% | 31 30.1% | 49 47.6% | 103 100.0% | 38 36.9% | 32 31.1% | 33 32.0% | 103 100.0% | 45 43.7% | 50 48.5% | 8 7.8% | 103 100.0% | 33.5 | 10.7 |
| 2 | 97 29.7% | 225 68.8% | 5 1.5% | 327 100.0% | 265 83.3% | 53 16.7% | 318 100.0% | 106 32.4% | 110 33.6% | 111 33.9% | 327 100.0% | 132 40.4% | 103 31.5% | 92 28.1% | 327 100.0% | 150 45.9% | 163 49.9% | 14 4.3% | 327 100.0% | 31.7 | 9.9 |
| 3 | 15 27.8% | 32 59.3% | 7 13.0% | 54 100.0% | 40 83.3% | 8 16.7% | 48 100.0% | 23 42.6% | 16 29.6% | 15 27.8% | 54 100.0% | 21 38.9% | 17 31.5% | 16 29.6% | 54 100.0% | 25 46.3% | 26 48.2% | 3 5.6% | 54 100.0% | 29.6 | 7.9 |
| Total | 143 29.6% | 327 67.6% | 14 2.9% | 484 100.0% | 392 84.1% | 74 15.9% | 466 100.0% | 152 31.4% | 157 32.4% | 175 36.2% | 484 100.0% | 191 39.5% | 152 31.4% | 141 29.1% | 484 100.0% | 220 45.5% | 239 49.4% | 25 5.2% | 484 100.0% | | |

| | | DCE 2 | | | | | | | | | | | | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | | Socio-demographics | | | | | | | | | | | | | | | | | | | | |
| | Gender | | | | Ethnicity | | | Education | | | | Employment | | | | Income | | | | Age | |
| Cluster | Male | Female | Non-binary | Total | Australian | Non-australian | Total | High-school or less | Diploma/certificate | University degree | Total | Full-time | Part-time | Not employed | Total | Low | Middle | High | Total | Mean | SD |
| 1 | 76 32.3% | 159 67.7% | 0 0.0% | 235 100.0% | 182 79.5% | 47 20.5% | 229 100.0% | 68 28.9% | 78 33.2% | 89 37.9% | 235 100.0% | 111 47.2% | 84 35.7% | 40 17.0% | 235 100.0% | 89 37.9% | 138 58.7% | 8 3.4% | 235 100.0% | 31.2 | 9.9 |
| 2 | 54 33.3% | 108 66.7% | 0 0.0% | 162 100.0% | 121 79.1% | 32 20.9% | 153 100.0% | 50 30.9% | 63 38.9% | 49 30.3% | 162 100.0% | 60 37.0% | 64 39.5% | 38 23.5% | 162 100.0% | 70 43.2% | 88 54.3% | 4 2.5% | 162 100.0% | 32.1 | 10.3 |
| 3 | 28 35.4% | 50 63.3% | 1 1.3% | 79 100.0% | 57 77.0% | 17 23.0% | 74 100.0% | 27 34.2% | 36 45.6% | 16 20.3% | 79 100.0% | 30 38.0% | 27 34.2% | 22 27.9% | 79 100.0% | 43 54.4% | 34 43.0% | 2 2.5% | 79 100.0% | 30.2 | 7.4 |
| Total | 158 33.2% | 317 66.6% | 1 0.2% | 476 100.0% | 360 79.0% | 96 21.1% | 456 100.0% | 145 30.5% | 177 37.2% | 154 32.4% | 476 100.0% | 201 42.2% | 175 36.8% | 100 21.0% | 476 100.0% | 202 42.4% | 260 54.6% | 14 2.9% | 476 100.0% | | |

SD: Standard Deviation

## 5.3 Association between demographics and HL Clusters

A multinomial logit model was estimated to explore associations between the demographic characteristics and the individual being allocated to each cluster (see **Appendix 2.2**).

Age was not found to be associated with clusters. This is consistent with Degan et al. (2019), who, similar to our sample, also had a generally young sample. For DCE 1 respondents, those with higher education levels (bachelors and postgraduate degrees) were more likely to be allocated to cluster 1 (high health literacy). Identifying as a non-binary individual was associated with being allocated to cluster 3 (low health literacy). There was no association between clusters and being male or female. All other demographic characteristics were not significantly associated with clusters.

For DCE 2 respondents, coefficient signs for gender, age and ethnicity were consistent with those of DCE 1 respondents. Respondents not employed were more likely to be allocated to Cluster 1, including retired persons. Respondents whose earnings were in the middle-income bracket were more likely to be allocated to cluster 3 (low health literacy). Given that several of the demographic characteristics are not significantly associated with health literacy, unobservable factors associated with being allocated to a health literacy cluster could be missing from this analysis, such as health and mental health comorbidities.

## 5.4 Conditional Logit Results

The conditional logit model results are shown in **Table 5.6**. The attributes in this model are all dummy coded to account for categorical attribute preferences. In DCE 1, all the attributes except the number of visits are statistically significant predictors of choice. The positive and significant coefficient for combination treatment of psychotherapy and pharmacotherapy suggests that respondents get higher utility relative to pharmacotherapy only. The negative and increasing cost coefficients suggest that individuals get disutility from increasing costs, which is expected. The positive and increasing coefficients of effectiveness also show that people prefer a treatment with better effectiveness. As expected, side-effects coefficients are negative, implying that individuals have disutility when they experience side-effects. Sexual dysfunction is the least preferred side-effect, followed by gastrointestinal side effects.

The alternative specific constants – asc 1 for treatment A and asc 2 for treatment B – are negative and significant. This implies that respondents are less likely to choose treatment A or treatment B compared to the status quo (current treatment) alternative once the observable

characteristics of each option are considered. The negative coefficient of asc1 (treatment A) is smaller than that of asc 2 (treatment B), indicating that respondents are more likely to choose treatment A relative to treatment B. This may suggest there is some 'straight lining', where individuals are more likely to choose an alternative that is located on one side of the scenario (left side in our DCE) (Johnson et al., 2019).

In DCE 2, coefficients are significant for all attributes and their directions align with coefficients from DCE 1. The coefficients of number of visits are significant, contrary to the results of DCE 1. The coefficient for a combination treatment is positive and significant, indicating a larger utility from a combination treatment relative to anti-depressants alone. Cost coefficients are negative and significant, which is the expected direction. The positive and increasing coefficients of effectiveness also shows that people are more likely to choose the treatment with higher effectiveness. As expected, side-effects coefficients are negative, implying that individuals have disutility when experiencing side effects. The alternative specific constants are positive and significant. This implies that respondents are more likely to choose treatment over no treatment (i.e., opt-out option) once the observable characteristic of each option are considered.

Another conditional logit model was performed for both DCEs with cost and effectiveness treated as continuous variables (instead of dummy-coded variables), assuming a linear functional form for both these attributes (see **Table 5.7**). We plotted the dummy coded variables against the cost attribute levels. The functional form was extremely close to linear. Treating cost as a continuous variable allows us to estimate individuals' WTP for treatment attributes. An increase in cost was negatively associated with choice, while an increase in treatment effectiveness is positively associated with choice.

*Table 5. 6. Conditional Logit Model Results - Dummy Coded Variables - DCE 1 & DCE 2*

| Attribute | Level | DCE 1 Coef. | SE | DCE 2 Coef. | SE |
|---|---|---|---|---|---|
| Treatment type | Psychotherapy | 0.064 | 0.143 | 0.011 | 0.154 |
| | Combination | 0.347 *** | 0.132 | 0.342 *** | 0.132 |
| Cost | $2 pw | -0.075 | 0.120 | -0.730 *** | 0.118 |
| | $10 pw | -0.343 *** | 0.119 | -0.584 *** | 0.120 |
| | $30 pw | -0.620 *** | 0.112 | -1.005 *** | 0.117 |
| | $90 pw | -1.269 *** | 0.139 | -1.664 *** | 0.157 |
| | $150 pw | -1.564 *** | 0.138 | -2.134 *** | 0.134 |
| | $350 pw | -2.190 *** | 0.132 | -2.488 *** | 0.129 |
| Effectiveness | 40 people for every 100 | 0.429 *** | 0.078 | 0.703 *** | 0.072 |
| | 55 people for every 100 | 0.745 *** | 0.081 | 0.917 *** | 0.077 |
| | 75 people for every 100 | 1.339 *** | 0.096 | 1.232 *** | 0.085 |
| Waiting time | 2 weeks | -0.180 ** | 0.077 | -0.209 *** | 0.063 |
| | 1 month | -0.256 *** | 0.082 | -0.068 | 0.083 |
| | 3 months | -0.569 *** | 0.080 | -0.535 *** | 0.069 |
| Number of visits | 4 visits | 0.037 | 0.117 | 0.205 ** | 0.097 |
| | 10 visits | 0.188 | 0.146 | 0.381 *** | 0.128 |
| | 16 visits | 0.247 * | 0.139 | 0.243 * | 0.125 |
| Side-effects | Sexual | -1.030 *** | 0.115 | -1.198 *** | 0.109 |
| | Weight | -0.831 *** | 0.108 | -0.790 *** | 0.107 |
| | Gastrointestinal | -0.980 *** | 0.114 | -1.253 *** | 0.112 |
| | Sleep | -0.743 *** | 0.100 | -0.321 *** | 0.091 |
| | Fatigue | -0.474 *** | 0.089 | -0.323 *** | 0.092 |
| Constant | asc1 | -0.386 ** | 0.173 | 1.943 *** | 0.176 |
| | asc2 | -0.502 *** | 0.181 | 1.878 *** | 0.179 |
| | Observations | | 17,424 | | 17,136 |
| | Log pseudolikelihood | | -5097.500 | | -4410.660 |
| | BIC | | 10429.39 | | 9055.3 |

*** p < 0.01, ** p < 0.05, * p < 0.1 – SE: Standard Error - BIC: Bayesian Information Criterion

Reference levels: Treatment type: Anti-depressants – cost: $0 – effectiveness: 15 people for every 100 – waiting time: no waiting time (immediate start) – number of visits: one visit (upon diagnosis) – side-effects: no side-effects

*Table 5.7. Conditional Logit Model Results - Cost & Effectiveness continuous - DCE 1 & DCE 2*

| Attribute | Level | DCE 1 Coef. | DCE 1 SE | DCE 2 Coef. | DCE 2 SE |
|---|---|---|---|---|---|
| Treatment type | Psychotherapy | 0.283 ** | 0.125 | 0.341 *** | 0.132 |
| | Combination | 0.312 *** | 0.120 | 0.070 * | 0.115 |
| Cost | Cost | -0.007 *** | 0.000 | -0.007 *** | 0.000 |
| Effectiveness | Effective | 0.024 *** | 0.002 | 0.022 *** | 0.001 |
| Waiting time | 2 weeks | -0.151 ** | 0.071 | -0.162 *** | 0.058 |
| | 1 month | -0.236 *** | 0.074 | -0.015 | 0.077 |
| | 3 months | -0.541 *** | 0.076 | -0.558 *** | 0.066 |
| Number of visits | 4 visits | 0.003 | 0.114 | 0.291 *** | 0.089 |
| | 10 visits | 0.046 | 0.138 | 0.405 *** | 0.112 |
| | 16 visits | 0.259 ** | 0.128 | 0.463 *** | 0.111 |
| Side-effects | Sexual | -1.139 *** | 0.106 | -1.292 *** | 0.104 |
| | Weight | -0.854 *** | 0.099 | -0.900 *** | 0.097 |
| | Gastrointestinal | -0.947 *** | 0.105 | -1.217 *** | 0.108 |
| | Sleep | -0.777 *** | 0.092 | -0.397 *** | 0.085 |
| | Fatigue | -0.484 *** | 0.081 | -0.187 ** | 0.081 |
| Constant | asc1 | -0.775 *** | 0.123 | 1.031 *** | 0.122 |
| | asc2 | -0.899 *** | 0.131 | 0.886 *** | 0.122 |
| | Observations | | 17,424 | | 17,136 |
| | Log pseudolikelihood | | -5143.130 | | -4483.170 |
| | BIC | | 10452 | | 9132.97 |

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$ – SE: Standard Error - BIC: Bayesian Information Criterion

Reference levels: Treatment type: Anti-depressants – waiting time: no waiting time (immediate start) – number of visits: one visit (upon diagnosis) – side-effects: no side-effects

## 5.5 Mixed Logit Model Results – DCE 1

The mixed logit model is typically preferred over the conditional logit model because it allows for preference heterogeneity. The BIC for the mixed logit model (9094.79 for DCE 1 and 8099.38 for DCE 2) shows an improvement of fit relative to the conditional logit model (10429.39 for DCE 1 and 9055.3 for DCE 2). This improvement is expected as the mixed logit model overcomes the limitations of the conditional logit model.

Results of the mixed logit model are shown in **Table 5.8**. The mean preference coefficients of the attributes are overall statistically significant - except treatment type in DCE 1 at 5% significance level - implying that they are predictors of choice. The negative and significant mean preference coefficients of waiting time and side-effects show that respondents generally prefer shorter waiting times and treatments with no side-effects. The size of the coefficients of side-effects indicates that the side-effect that causes the largest disutility is sexual dysfunction,

followed by gastrointestinal side-effects, weight gain, sleep disturbances and fatigue/ tiredness. However, the mean differences between sexual dysfunction and gastrointestinal side-effects and between sexual dysfunction and weight gain are statistically insignificant at 5% significance level **(see Appendix 3.1**). The mean differences between sexual dysfunction and sleep disturbance and between sexual dysfunction and fatigue/ tiredness is statistically significant, indicating that sexual dysfunction causes a higher disutility than these two side-effects. The mean differences between gastrointestinal, sleep and fatigue side-effects are all statistically significant, indicating decreasing disutility in those following orders.

The mean difference is calculated by using the delta method. We subtracted the preference coefficient of one variable from the preference coefficient of the other variable using the non-linear combination of estimators (-nlcom-) command in STATA which calculates point estimated, SE, test statistics and significance levels for any combination of parameters (Baum, 2006). All mean difference results for DCE 1 can be found in **Appendix 3.1**.

*Table 5.8. Mixed Logit Model Results - DCE 1 & DCE 2*

| Attribute | Level | DCE 1 | | | | DCE 2 | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | SE | SD | SE | Mean | SE | SD | SE |
| Treatment type | Psychotherapy | -0.110 | 0.209 | 1.552 *** | 0.143 | 0.618 *** | 0.213 | 1.678 *** | 0.155 |
| | Combination | 0.316 * | 0.181 | 0.691 *** | 0.215 | 0.364 * | 0.191 | 1.134 *** | 0.115 |
| Waiting time | 2 weeks | -0.402 *** | 0.121 | -0.090 | 0.982 | -0.374 *** | 0.119 | 0.089 | 0.218 |
| | 1 month | -0.400 *** | 0.126 | 0.352 | 0.387 | -0.113 | 0.141 | 0.650 *** | 0.194 |
| | 3 months | -1.023 *** | 0.136 | 1.282 *** | 0.160 | -1.044 *** | 0.120 | 0.896 *** | 0.142 |
| Number of visits | 4 visits | 0.148 | 0.172 | 0.683 *** | 0.155 | 0.483 *** | 0.149 | 0.121 | 0.207 |
| | 10 visits | 0.409 ** | 0.196 | -0.216 | 0.263 | 0.787 *** | 0.182 | -0.528 ** | 0.224 |
| | 16 visits | 0.559 *** | 0.195 | 0.587 *** | 0.222 | 0.682 *** | 0.184 | 0.734 ** | 0.141 |
| Side-effects | Sexual | -1.794 *** | 0.199 | 0.978 *** | 0.369 | -2.637 *** | 0.211 | 1.793 ** | 0.237 |
| | Weight | -1.588 *** | 0.178 | 1.133 *** | 0.277 | -1.593 *** | 0.171 | -1.279 ** | 0.215 |
| | Gastrointestinal | -1.666 *** | 0.234 | 1.131 *** | 0.437 | -2.575 *** | 0.217 | 1.842 ** | 0.234 |
| | Sleep | -1.217 *** | 0.155 | -0.807 *** | 0.207 | -0.959 *** | 0.148 | 0.965 ** | 0.191 |
| | Fatigue | -0.701 *** | 0.137 | 0.410 | 0.330 | -0.522 *** | 0.129 | 0.339 | 0.278 |
| Effectiveness | Effective | 0.040 *** | 0.003 | 0.033 *** | 0.004 | 0.049 *** | 0.003 | 0.051 *** | 0.007 |
| Cost | Cost | -0.120 *** | 0.036 | 0.857 * | 0.482 | -0.028 *** | 0.003 | 0.048 *** | 0.010 |
| Constant | asc1 | -0.667 *** | 0.153 | 0.985 *** | 0.102 | 1.681 *** | 0.151 | 0.610 *** | 0.112 |
| | asc2 | -0.808 *** | 0.170 | 1.179 *** | 0.123 | 1.414 *** | 0.158 | -0.535 *** | 0.114 |
| | | Observations | | | 17,424 | Observations | | | 17,136 |
| | | Log Likelihood | | | -4381.38 | Log Likelihood | | | -3883.96 |
| | | BIC | | | 9094.79 | BIC | | | 8099.38 |

*** p < 0.01, ** p < 0.05, * p < 0.1 – SE: Standard Error – SD: Standard Deviation BIC: Bayesian Information Criterion

Reference levels: Treatment type: Anti-depressants– waiting time: no waiting time (immediate start) – number of visits: one visit (upon diagnosis) – side-effects: no side-effects

Interestingly, the positive and significant coefficients for number of visits imply that individuals prefer to visit their specialist/GP more frequently, compared to one visit only (upon diagnosis). However, there is no statistically significant difference between 10 visits and 16 visits.

The positive mean coefficient for a combination treatment indicates that a combination treatment of psychotherapy and anti-depressants is preferred over anti-depressant alone, however, this is only statistically significant at 10% (p-value=0.08).

The mean and standard deviation of preference weights for cost and effectiveness (attributes with log-normal distributions) are calculated using the delta method in STATA. As expected, the positive and significant estimates for effectiveness and the negative and significant estimates for cost indicate that individuals prefer cheaper and more effective treatments.

There is significant preference heterogeneity within the mixed logit model as indicated by the significant standard deviations. Preference heterogeneity exists for cost effectiveness, and treatment type. Some heterogeneity also exists for waiting time (3 months only), number of visits (excluding 10 visits), and side-effects (excluding fatigue/ tiredness).

## 5.6 Mixed Logit Model Results – DCE 2

Similar to the results of DCE 1, respondents generally prefer shorter waiting times and treatments with no side-effects. The coefficients of waiting time indicate that individuals have a lower preference for a waiting time of 2 weeks compared to no waiting time, while a waiting time of 3 months results in substantial disutility. The coefficients' magnitudes of side-effects follow the same order as DCE 1. The mean differences between the levels of side-effects are almost all statistically significant at 1%, (except for the disutility decrease from sexual dysfunction to gastrointestinal side-effects). Sexual dysfunction is the least preferred, followed by weight gain, sleep disturbance and fatigue/ tiredness, in that order. All mean difference results for DCE 2 can be found in **Appendix 3.2**.

Unlike the results in DCE 1, results show that both psychotherapy and a combination treatment are preferred over receiving anti-depressants only. The mean preference coefficients show psychotherapy is preferred over a combination treatment. Number of visits is a significant predictor of choice. The positive coefficients show that all levels of number of visits are preferred over 1 visit only. The coefficients weights show that the level of 10 visits is the most preferred level, followed by 16 visits, and 4 visits. The difference in mean coefficients between

10 and 16 visits is not statistically significant, negating the order of preference. However, the difference between 4 visits and 16 visits is statistically significant at 10% (p-value=0.061), indicating that 16 visits is preferred over 4 visits only. The preference coefficients of cost and effectiveness in DCE 2 indicate that individuals prefer cheaper and more effective treatments.

There is significant preference heterogeneity within the mixed logit model of DCE 2 as shown by the significant standard deviations. Preference heterogeneity exists for almost all attribute levels, with the exception of 4 visits, 2 weeks of waiting time and fatigue/ tiredness as a side-effect.

## 5.7 Health Literacy Sub-Group Analysis – Mixed Logit Models

The attribute 'effectiveness' was interacted with the three health literacy clusters of DCE 1 to estimate three preference coefficients for effectiveness, one for each cluster. The interaction terms are specified as random variables. Results are shown in **Table 5.9**. Overall, health literacy seems to impact preferences for effectiveness, but this effect differed across the two samples. For DCE 1, effectiveness preference coefficients were higher on average for those with the lowest health literacy. However, the mean preference for effectiveness is only significantly different between cluster 2 (moderate health literacy patterns) and cluster 3 (low health literacy patterns) (p-value=0.02) (see **Appendix 3.1**).

In DCE 2, the interaction term between HL clusters and effectiveness shows that individuals in cluster 1 (overall high literacy scores) and cluster 2 (overall moderate health literacy) value treatment effectiveness more than those in cluster 3 (low health literacy scores). This preference difference between cluster 1 and cluster 3 is statistically significant at 1% (p-value=0.000) (see **Appendix 3.2**).

*Table 5.9. Interaction Results – Effectiveness X Health literacy – DCE 1 & DCE 2*

| | | DCE 1 | | | | DCE 2 | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | SE | SD | SE | Mean | SE | SD | SE |
| Effectiveness * | effectiveXcluster1 | 0.039 *** | 0.005 | 0.038 *** | 0.012 | 0.054 *** | 0.005 | 0.040 *** | 0.008 |
| Health literacy | effectiveXcluster2 | 0.037 *** | 0.003 | 0.034 *** | 0.005 | 0.043 *** | 0.005 | 0.049 *** | 0.010 |
| | effectiveXcluster3 | 0.045 *** | 0.005 | 0.029 *** | 0.007 | 0.028 *** | 0.004 | 0.034 *** | 0.008 |
| Treatment type | Psychotherapy | -0.157 | 0.206 | 1.562 *** | 0.139 | 0.527 ** | 0.206 | 1.616 *** | 0.151 |
| | Combination | 0.301 * | 0.177 | 0.658 *** | 0.139 | 0.319 * | 0.186 | 1.127 *** | 0.116 |
| Waiting time | 2 weeks | -0.407 *** | 0.118 | -0.293 | 0.239 | -0.333 *** | 0.116 | -0.084 | 0.201 |
| | 1 month | -0.384 *** | 0.121 | -0.314 | 0.258 | -0.131 | 0.135 | 0.225 | 0.298 |
| | 3 months | -0.920 *** | 0.126 | 1.115 *** | 0.151 | -1.020 *** | 0.116 | 0.745 *** | 0.150 |
| Number of visits | 4 visits | 0.180 | 0.165 | 0.551 *** | 0.155 | 0.499 *** | 0.149 | 0.094 | 0.190 |
| | 10 visits | 0.437 ** | 0.192 | 0.465 ** | 0.191 | 0.817 *** | 0.181 | -0.461 * | 0.242 |
| | 16 visits | 0.585 *** | 0.191 | 0.530 ** | 0.207 | 0.716 *** | 0.185 | 0.887 *** | 0.139 |
| Side-effects | Sexual | -1.707 *** | 0.194 | 0.960 *** | 0.270 | -2.484 *** | 0.204 | 1.845 *** | 0.231 |
| | Weight | -1.546 *** | 0.173 | 1.152 *** | 0.264 | -1.569 *** | 0.171 | 1.312 *** | 0.205 |
| | Gastrointestinal | -1.612 *** | 0.186 | 1.083 *** | 0.280 | -2.377 *** | 0.206 | 1.813 *** | 0.254 |
| | Sleep | -1.157 *** | 0.148 | 0.654 *** | 0.212 | -0.860 *** | 0.145 | 0.976 *** | 0.161 |
| | Fatigue | -0.643 *** | 0.128 | -0.187 | 0.277 | -0.490 *** | 0.128 | -0.553 *** | 0.179 |
| Cost | Cost | -3.980 *** | 0.126 | 1.841 *** | 0.144 | -4.380 *** | 0.072 | 1.135 *** | 0.076 |
| Constant | asc1 | -0.656 *** | 0.153 | 0.962 *** | 0.110 | 1.646 *** | 0.150 | 0.607 *** | 0.110 |
| | asc2 | -0.819 *** | 0.167 | 1.091 *** | 0.117 | 1.372 *** | 0.158 | -0.514 *** | 0.120 |
| | | Observations | | | 17,424 | Observations | | | 17,136 |
| | | Log Likelihood | | | -4389.5 | Log Likelihood | | | -3879.85 |
| | | BIC | | | 9150.09 | BIC | | | 8130.17 |

*** p < 0.01, ** p < 0.05, * p < 0.1 – SE: Standard Error – SD: Standard Deviation BIC: Bayesian Information Criterion – Cluster 1: Overall high health literacy – Cluster 2: Overall moderate health literacy – Cluster 3: Overall low health literacy

Reference levels: Treatment type: anti-depressants– waiting time: no waiting time (immediate start) – number of visits: one visit (upon diagnosis) – side-effects: no side-effects

The sign of the estimated standard deviations is irrelevant: interpret them as being positive

Treatment type was also interacted with the three health literacy clusters. These interaction terms were specified as random variables. Results are shown in **Table 5.10.** On average, respondents clustered into clusters 2 and 3 prefer a combination treatment over a treatment that includes anti-depressants only, with cluster 3 preferring a combination treatment more strongly. The higher statistical significance of the interaction terms relative to the main effects of combination treatment (see **Table 5.8**) indicates that there is a stronger preference for treatment types in health literacy sub-group analysis. Preferences for a combination treatment for both clusters could be somewhat driven by the current treatment type experience of these individuals. Our data shows that 149 out of 203 (73.4%) individuals who are currently

receiving a combination treatment are allocated to either cluster 2 or cluster 3. Cluster 1 also prefers a combination treatment, but the effect is small and is not statistically significant.

In DCE 2, the preferences that suggest that individuals prefer psychotherapy over a combination treatment over anti-depressants (**Table 5.8**) only remain in cluster 1 of the sub-group analysis (**Table 5.10**). Interaction terms with cluster 2 and 3 are insignificant, implying that health literacy does not impact treatment preferences for these clusters. The positive and significant coefficients show that individuals in cluster 1 prefer a receiving psychotherapy followed by a combination treatment of psychotherapy and anti-depressants over a treatment that includes anti-depressants only. However, there is no statistical difference between both coefficients (see **Appendix 3.2**). There is therefore not enough evidence that a combination treatment is more preferred than psychotherapy for cluster 1 respondents. Overall, the significant SDs indicate that unobserved heterogeneity exists for treatments across all clusters.

*Table 5.10. Interaction Results – Treatment type X Health literacy – DCE 1 & DCE 2*

| | | DCE 1 | | | | DCE 2 | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | SE | SD | SE | Mean | SE | SD | SE |
| Treatment type * | PsychotherapyXcluster1 | -0.311 | 0.299 | 1.682 *** | 0.296 | 0.799 *** | 0.225 | *** | 0.200 |
| Health literacy | PsychotherapyXcluster2 | -0.187 | 0.209 | 1.307 *** | 0.153 | 0.403 | 0.256 | 1.375 *** | 0.228 |
| | PsychotherapyXcluster3 | 0.337 | 0.375 | 1.938 *** | 0.386 | 0.290 | 0.373 | -2.376 *** | 0.364 |
| | CombinationXcluster1 | 0.128 | 0.211 | 0.347 | 0.279 | 0.565 *** | 0.194 | 0.843 *** | 0.136 |
| | CombinationXcluster2 | 0.353 ** | 0.178 | 0.622 *** | 0.191 | -0.056 | 0.211 | 0.988 *** | 0.152 |
| | CombinationXcluster3 | 0.663 ** | 0.280 | 0.932 ** | 0.361 | -0.088 | 0.276 | -1.438 *** | 0.241 |
| Waiting time | 2 weeks | -0.376 *** | 0.113 | -0.330 * | 0.197 | -0.308 *** | 0.107 | -0.034 | 0.190 |
| | 1 month | -0.383 *** | 0.117 | -0.357 | 0.243 | -0.161 | 0.125 | -0.061 | 0.233 |
| | 3 months | -0.911 *** | 0.120 | 1.003 *** | 0.143 | -0.966 *** | 0.106 | -0.664 *** | 0.155 |
| Side-effects | Sexual | -1.655 *** | 0.182 | 0.968 *** | 0.252 | -2.310 *** | 0.188 | 1.804 *** | 0.211 |
| | Weight | -1.345 *** | 0.158 | 0.945 *** | 0.248 | -1.438 *** | 0.158 | -1.243 *** | 0.190 |
| | Gastrointestinal | -1.599 *** | 0.179 | 1.096 *** | 0.248 | -2.238 *** | 0.190 | 1.680 *** | 0.214 |
| | Sleep | -1.067 *** | 0.143 | 0.485 | 0.322 | -0.765 *** | 0.138 | 1.054 *** | 0.167 |
| | Fatigue | -0.632 *** | 0.127 | -0.313 | 0.286 | -0.418 *** | 0.123 | -0.580 *** | 0.198 |
| Effectiveness | Effective | -3.500 *** | 0.072 | 0.608 *** | 0.048 | -3.448 *** | 0.075 | 0.767 *** | 0.056 |
| Cost | Cost | -3.965 *** | 0.108 | 1.938 *** | 0.131 | -4.464 *** | 0.066 | 1.082 *** | 0.068 |
| Number of visits | 4 visits | 0.189 | 0.157 | | | 0.455 *** | 0.144 | | |
| | 10 visits | 0.417 ** | 0.184 | | | 0.740 *** | 0.173 | | |
| | 16 visits | 0.539 *** | 0.183 | | | 0.657 *** | 0.173 | | |
| Constant | asc1 | -0.641 *** | 0.150 | 0.991 *** | 0.112 | 1.616 *** | 0.145 | -0.490 *** | 0.115 |
| | asc2 | -0.774 *** | 0.163 | 1.170 *** | 0.112 | 1.386 *** | 0.153 | -0.575 *** | 0.110 |
| | Observations | | | | 17,424 | Observations | | | 17,136 |
| | Log Likelihood | | | | -4409.81 | Log Likelihood | | | -3907.61 |
| | BIC | | | | 9200.49 | BIC | | | 8195.42 |

*** p < 0.01, ** p < 0.05, * p < 0.1 – SE: Standard Error – SD: Standard Deviation BIC: Bayesian Information Criterion – Cluster 1: Overall high health literacy – Cluster 2: Overall moderate health literacy – Cluster 3: Overall low health literacy

Reference levels: Treatment type: anti-depressants - waiting time: no waiting time (immediate start) – number of visits: one visit (upon diagnosis) – side-effects: no side-effects

The sign of the estimated standard deviations is irrelevant: interpret them as being positive

Waiting time and health literacy interactions were also specified as random variables. Results are shown in **Table 5.11**. The interactions with cluster 3 in DCE 1 are insignificant, perhaps due to its small sample size (n=54). Most coefficients are negative, indicating that individuals in all clusters overall disfavour an increase in waiting time, relative to immediate start of treatment (no waiting time). For lengthy waiting times (i.e., 3 months), those in cluster 1 get a lower disutility than those in cluster 2. This could indicate that highly literate individuals are willing to wait longer if they achieve good health outcomes. There is some unobserved heterogeneity for the preference of waiting time within all three clusters.

In DCE 2, individuals in all clusters experience a utility loss from higher waiting time prior to commencement of the treatment, compared to an immediate treatment (no waiting time). Disutility is largest in all clusters when waiting time is 3 months. However, the mean difference of coefficients indicates that there is no statistical difference for preference for waiting time across clusters (see **Appendix 3.2**).

Table 5.11.  Interaction Results - Waiting Time X Health Literacy - DCE 1 & DCE 2

| | | DCE 1 | | | | DCE 2 | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | SE | SD | SE | Mean | SE | SD | SE |
| Waiting time * Health literacy | 2weeksXcluster1 | -0.715 *** | 0.210 | -0.690 ** | 0.336 | -0.224 * | 0.128 | -0.366 | 0.283 |
| | 2weeksXcluster2 | -0.306 ** | 0.120 | -0.068 | 0.338 | -0.334 ** | 0.145 | -0.456 * | 0.275 |
| | 2weeksXcluster3 | -0.191 | 0.264 | 0.508 | 0.577 | -0.634 *** | 0.199 | -0.001 | 0.426 |
| | 1monthXcluster1 | -0.708 *** | 0.195 | 0.007 | 0.351 | -0.091 | 0.137 | 0.452 | 0.292 |
| | 1monthXcluster2 | -0.501 *** | 0.135 | -0.681 *** | 0.222 | -0.373 ** | 0.160 | 0.234 | 0.362 |
| | 1monthXcluster3 | 0.037 | 0.307 | 1.389 *** | 0.411 | -0.322 | 0.235 | 0.622 | 0.562 |
| | 3monthsXcluster1 | -0.984 *** | 0.257 | 1.323 *** | 0.355 | -0.821 *** | 0.117 | -0.595 *** | 0.176 |
| | 3monthsXcluster2 | -1.129 *** | 0.139 | 0.964 *** | 0.174 | -0.942 *** | 0.140 | -0.641 *** | 0.198 |
| | 3monthsXcluster3 | 0.111 | 0.220 | -0.670 * | 0.358 | -0.982 *** | 0.203 | -0.911 *** | 0.264 |
| Side-effects | Sexual | -1.814 *** | 0.190 | 1.255 *** | 0.198 | -2.030 *** | 0.174 | 1.665 *** | 0.200 |
| | Weight | -1.441 *** | 0.166 | 1.150 *** | 0.222 | -1.413 *** | 0.154 | 1.282 *** | 0.187 |
| | Gastrointestinal | -1.553 *** | 0.173 | 1.022 *** | 0.220 | -2.140 *** | 0.187 | 1.915 *** | 0.216 |
| | Sleep | -1.087 *** | 0.143 | 0.482 | 0.301 | -0.666 *** | 0.131 | 1.094 *** | 0.144 |
| | Fatigue | -0.681 *** | 0.132 | 0.624 *** | 0.205 | -0.348 *** | 0.117 | -0.613 *** | 0.185 |
| Effectiveness | Effective | -3.559 *** | 0.076 | 0.707 *** | 0.063 | -3.552 *** | 0.076 | 0.812 *** | 0.057 |
| Cost | Cost | -4.143 *** | 0.161 | 1.749 *** | 0.247 | -4.541 *** | 0.069 | 1.158 *** | 0.071 |
| Treatment type | Psychotherapy | 0.140 | 0.191 | | | 0.416 ** | 0.174 | | |
| | Combination | 0.425 ** | 0.166 | | | 0.248 | 0.159 | | |
| Number of visits | 4 visits | 0.163 | 0.160 | | | 0.431 *** | 0.139 | | |
| | 10 visits | 0.354 * | 0.182 | | | 0.608 *** | 0.164 | | |
| | 16 visits | 0.481 *** | 0.182 | | | 0.571 *** | 0.164 | | |
| Constant | asc1 | -0.765 *** | 0.167 | 1.180 *** | 0.115 | 1.533 *** | 0.138 | 0.495 *** | 0.098 |
| | asc2 | -0.859 *** | 0.175 | 1.355 *** | 0.110 | 1.333 *** | 0.145 | 0.470 *** | 0.103 |
| | | Observations | | | 17,424 | Observations | | | 17,136 |
| | | Log Likelihood | | | -4449.81 | Log Likelihood | | | -4008.14 |
| | | BIC | | | 9094.79 | BIC | | | 8415.98 |

*** p < 0.01, ** p < 0.05, * p < 0.1 – SE: Standard Error – SD: Standard Deviation BIC: Bayesian Information Criterion – Cluster 1: Overall high health literacy – Cluster 2: Overall moderate health literacy – Cluster 3: Overall low health literacy

Reference levels: Treatment type: Anti-depressants – waiting time: no waiting time (immediate start) - number of visits: one visit (upon diagnosis) – side-effects: no side-effects

The sign of the estimated standard deviations is irrelevant: interpret them as being positive

## 5.8 Gender Sub-Group Analysis - Mixed Logit Models

The effect of gender on depression treatment preference attributes is not yet fully understood (Dorow et al., 2018). We therefore undertook a subgroup analysis to explore gender differences. Sub-group analysis with the non-binary gender in DCE 2 was not analysed due to a small sample size (n=1). All pharmacotherapy side-effect levels were interacted with gender. The interaction terms are specified as random variables. Results are shown in **Table 5.12.** The coefficients are all negative, which suggests all genders do not prefer side-effects, although females seem to experience a greater disutility from side-effects. The mean coefficients in DCE 1 for the interaction terms with non-binary genders are mostly not significant, likely due to the small sample size (n=14) of non-binary people in this study. Sexual dysfunction causes

disutility for both males and females, with a higher negative coefficient for females. The difference in mean coefficients is statistically significant at 10% (p-value=0.076) (see **Appendix 3.1**). Weight gain also causes larger disutility for females compared to males. The mean difference is statistically significant at 1% significance (p-value=0.002) (see **Appendix 3.1**). Females also have a larger negative coefficient than males for gastrointestinal side-effects. The significant standard deviations of the interaction terms between side-effects and gender indicates that there are somewhat similar levels of unobserved heterogeneity between males and females for all side-effects (except sleep disturbances).

Like DCE 1, the interaction terms in DCE 2 between side-effects and gender show that all genders disfavour a treatment that causes side-effects, especially for those that cause sexual dysfunction, weight gain and gastrointestinal problems. Preference for treatment that cause sexual dysfunction is not statistically different between males and females (see **Appendix 3.2**). The negative and significant coefficients for weight gain indicate that females could disfavour treatments that cause weight gain more than males, however, this difference is insignificant (see **Appendix 3.2**). Gastrointestinal side-effects decrease utility for both males and females, with no statistical difference between the two (see **Appendix 3.2**).

*Table 5.12. Interaction Results - Side-effects X Gender - DCE 1 & DCE 2*

| | | DCE 1 | | | | DCE 2 | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | SE | SD | SE | Mean | SE | SD | SE |
| Side-effects * Gender | SexualXmale | -1.316 *** | 0.298 | 1.269 *** | 0.379 | -2.302 *** | 0.335 | 2.015 *** | 0.360 |
| | Sexual2Xfemale | -1.945 *** | 0.229 | 1.147 *** | 0.268 | -2.096 *** | 0.199 | 1.629 *** | 0.235 |
| | WeightXmale | -0.888 *** | 0.257 | 1.334 *** | 0.348 | -1.463 *** | 0.233 | 1.225 *** | 0.333 |
| | WeightXfemale | -1.855 *** | 0.211 | 1.208 *** | 0.257 | -1.495 *** | 0.179 | 1.415 *** | 0.224 |
| | GastrointestinalXmale | -0.948 *** | 0.239 | 0.919 ** | 0.402 | -2.048 *** | 0.288 | 2.073 *** | 0.328 |
| | GastrointestinalXfemale | -1.816 *** | 0.205 | 0.984 *** | 0.274 | -2.283 *** | 0.219 | 1.950 *** | 0.256 |
| | SleepXmale | -0.864 *** | 0.215 | 0.743 ** | 0.327 | -0.827 *** | 0.188 | 1.001 *** | 0.243 |
| | SleepXfemale | -1.335 *** | 0.167 | 0.741 *** | 0.246 | -0.697 *** | 0.140 | 0.978 *** | 0.159 |
| | FatigueXmale | -0.730 *** | 0.224 | 0.932 *** | 0.337 | -0.613 *** | 0.174 | -0.706 ** | 0.283 |
| | FatigueXfemale | -0.620 *** | 0.137 | 0.073 | 0.577 | -0.219 * | 0.128 | -0.517 ** | 0.218 |
| Effectiveness | Effective | -3.607 *** | 0.080 | 0.776 *** | 0.071 | -3.529 *** | 0.077 | 0.894 *** | 0.065 |
| Cost | Cost | -4.070 *** | 0.104 | 1.934 *** | 0.150 | -4.557 *** | 0.072 | 1.124 *** | 0.070 |
| Treatment type | Psychotherapy | 0.079 | 0.178 | | | 0.424 ** | 0.172 | | |
| | Combination | 0.434 *** | 0.165 | | | 0.291 * | 0.160 | | |
| Waiting time | 2 weeks | -0.361 *** | 0.106 | | | -0.361 *** | 0.099 | | |
| | 1 month | -0.434 *** | 0.105 | | | -0.210 * | 0.107 | | |
| | 3 months | -0.753 *** | 0.094 | | | -0.887 *** | 0.089 | | |
| Number of visits | 4 visits | 0.153 | 0.160 | | | 0.416 *** | 0.138 | | |
| | 10 visits | 0.344 * | 0.182 | | | 0.573 *** | 0.163 | | |
| | 16 visits | 0.461 ** | 0.181 | | | 0.543 *** | 0.163 | | |
| Constant | asc1 | -0.744 *** | 0.151 | | | 1.509 *** | 0.137 | 0.506 *** | 0.097 |
| | asc2 | -0.826 *** | 0.162 | | | 1.324 *** | 0.144 | 0.495 *** | 0.101 |
| | | Observations | | | 17,424 | Observations | | | 17,136 |
| | | Log Likelihood | | | -4445.68 | Log Likelihood | | | -3987.46 |
| | | BIC | | | 9340.58 | BIC | | | 8423.38 |

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$ – SE: Standard Error – SD: Standard Deviation BIC: Bayesian Information Criterion

Reference levels: Treatment type: Anti-depressants – waiting time: no waiting time (immediate start) – number of visits: one visit (upon diagnosis) – side-effects: no side-effects

The sign of the estimated standard deviations is irrelevant: interpret them as being positive

Interaction terms between gender and treatment type in DCE 1 show that men and non-binary individuals prefer anti-depressants over psychotherapy, with non-binary people having a stronger preference (see **Table 5.13**). This finding could be explained by males preferring to not talk about their feelings and experiences to another person (Dwight-Johnson et al., 2010; Houle et al., 2013).

In DCE 2, results show that only females are more likely to choose psychotherapy over anti-depressants alone. Preference heterogeneity exists for both treatments for both males and females.

*Table 5.13. Interaction Results - Treatment Type X Gender - DCE 1 & DCE 2*

| | | DCE 1 | | | | DCE 2 | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | SE | SD | SE | Mean | SE | SD | SE |
| Treatment type * Gender | PsychotherapyXmale | -0.461 * | 0.257 | 1.712 *** | 0.247 | 0.234 | 0.264 | 1.572 *** | 0.227 |
| | PsychotherapyXfemale | -0.109 | 0.215 | 1.412 *** | 0.153 | 0.669 *** | 0.212 | 1.373 *** | 0.158 |
| | PsychotherapyXnon-binary | -1.761 *** | 0.655 | -0.941 | 0.878 | -0.406 | 2.078 | -0.020 | 1.827 |
| | CombinationXmale | 0.224 | 0.199 | 0.599 *** | 0.217 | 0.211 | 0.222 | 1.137 *** | 0.167 |
| | CombinationXfemale | 0.262 | 0.176 | 0.511 ** | 0.251 | 0.260 | 0.186 | 1.138 *** | 0.124 |
| | CombinationXnon-binary | -0.316 | 0.856 | 2.715 *** | 0.704 | 1.011 | 1.566 | -0.035 | 1.383 |
| Waiting time | 2 weeks | -0.354 *** | 0.114 | -0.463 ** | 0.182 | -0.306 *** | 0.107 | -0.087 | 0.236 |
| | 1 month | -0.336 *** | 0.114 | 0.172 | 0.608 | -0.103 | 0.128 | -0.481 ** | 0.193 |
| | 3 months | -0.926 *** | 0.123 | 1.034 *** | 0.143 | -0.906 *** | 0.104 | 0.466 * | 0.252 |
| Side-effects | Sexual | -1.678 *** | 0.186 | 1.084 *** | 0.250 | -2.311 *** | 0.193 | 1.743 *** | 0.213 |
| | Weight | -1.382 *** | 0.160 | 1.019 *** | 0.227 | -1.445 *** | 0.156 | 1.181 *** | 0.214 |
| | Gastrointestinal | -1.538 *** | 0.170 | 0.882 *** | 0.265 | -2.224 *** | 0.191 | 1.809 *** | 0.248 |
| | Sleep | -1.102 *** | 0.142 | 0.654 *** | 0.229 | -0.780 *** | 0.137 | 1.020 *** | 0.164 |
| | Fatigue | -0.611 *** | 0.124 | 0.249 | 0.329 | -0.421 *** | 0.120 | 0.304 | 0.248 |
| Effectiveness | Effective | -3.526 *** | 0.074 | 0.641 *** | 0.054 | -3.477 *** | 0.075 | 0.793 *** | 0.058 |
| Cost | Cost | -3.963 *** | 0.127 | 1.963 *** | 0.147 | -4.459 *** | 0.068 | 1.086 *** | 0.063 |
| Number of visits | 4 visits | 0.229 | 0.156 | | | 0.475 *** | 0.144 | | |
| | 10 visits | 0.495 *** | 0.182 | | | 0.765 *** | 0.173 | | |
| | 16 visits | 0.593 *** | 0.181 | | | 0.684 *** | 0.173 | | |
| Constant | asc1 | -0.609 *** | 0.154 | 0.987 *** | 0.108 | 1.615 *** | 0.142 | 0.428 *** | 0.128 |
| | asc2 | -0.755 *** | 0.164 | 1.169 *** | 0.124 | 1.352 *** | 0.151 | 0.592 *** | 0.094 |
| | | Observations | | | 17,424 | Observations | | | 17,136 |
| | | Log Likelihood | | | -4408.2 | Log Likelihood | | | -3929.17 |
| | | BIC | | | 9197.27 | BIC | | | 8238.55 |

*** p < 0.01, ** p < 0.05, * p < 0.1 – SE: Standard Error – SD: Standard Deviation BIC: Bayesian Information Criterion

Reference levels: Treatment type: Anti-depressants – waiting time: no waiting time (immediate start) – number of visits: one visit (upon diagnosis) – side-effects: no side-effects

The sign of the estimated standard deviations is irrelevant: interpret them as being positive

The preference coefficients for the interaction of cost with gender (see **Table 5.14)** are all negative, which is the expected direction. However, the effect of gender on cost preference is only statistically significant for females.

In DCE 2 however, significant and negative preference coefficients for costs interacted with gender indicate that both genders prefer lower costs. There is no statistical difference between the mean preference of cost of males and females (see **Appendix 3.2**).

Table 5.14. Interaction Results - Cost X Gender - DCE 1 & DCE 2

| | | DCE 1 | | | | DCE 2 | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | SE | SD | SE | Mean | SE | SD | SE |
| Cost * Gender | CostXmale | -0.260 | 0.172 | 4.679 | 6.351 | -0.035 *** | 0.005 | 0.097 *** | 0.029 |
| | CostXfemale | -0.064 *** | 0.017 | 0.227 ** | 0.115 | -0.017 *** | 0.001 | 0.025 *** | 0.004 |
| | CostXnon-binary | -11.649 | 39.029 | 526.147 | 3082.002 | -0.050 * | 0.029 | 0.001 | 0.034 |
| Number of visits | 4 visits | 0.078 | 0.163 | 0.649 *** | 0.112 | 0.455 *** | 0.141 | 0.491 *** | 0.124 |
| | 10 visits | 0.335 * | 0.182 | -0.182 | 0.286 | 0.582 *** | 0.166 | -0.333 | 0.224 |
| | 16 visits | 0.456 ** | 0.183 | 0.583 *** | 0.159 | 0.548 *** | 0.171 | 0.893 *** | 0.126 |
| Side-effects | Sexual | -1.748 *** | 0.189 | 1.123 *** | 0.240 | -2.210 *** | 0.179 | 1.566 *** | 0.200 |
| | Weight | -1.549 *** | 0.174 | 1.260 *** | 0.233 | -1.432 *** | 0.158 | 1.407 *** | 0.206 |
| | Gastrointestinal | -1.456 *** | 0.164 | 0.699 ** | 0.274 | -2.258 *** | 0.188 | 1.785 *** | 0.199 |
| | Sleep | -1.154 *** | 0.144 | 0.706 *** | 0.196 | -0.744 *** | 0.133 | 1.084 *** | 0.145 |
| | Fatigue | -0.664 *** | 0.128 | 0.274 | 0.358 | -0.400 *** | 0.119 | -0.557 *** | 0.193 |
| Effectiveness | Effective | -3.632 *** | 0.084 | 0.821 *** | 0.071 | -3.508 *** | 0.077 | 0.895 *** | 0.054 |
| Waiting time | 2 weeks | -0.374 *** | 0.109 | | | -0.310 *** | 0.103 | | |
| | 1 month | -0.440 *** | 0.110 | | | -0.169 | 0.115 | | |
| | 3 months | -0.752 *** | 0.096 | | | -0.893 *** | 0.092 | | |
| Treatment type | Psychotherapy | 0.078 | 0.180 | | | 0.335 ** | 0.176 | | |
| | Combination | 0.403 ** | 0.166 | | | 0.233 | 0.163 | | |
| Constant | asc1 | -0.733 *** | 0.148 | 1.133 *** | 0.093 | 1.593 *** | 0.136 | 0.390 *** | 0.108 |
| | asc2 | -0.810 *** | 0.158 | 1.149 *** | 0.095 | 1.361 *** | 0.143 | 0.386 *** | 0.107 |
| | Observations | | | | 17,424 | Observations | | | 17,136 |
| | Log Likelihood | | | | -4466.2644 | Log Likelihood | | | -3970.85 |
| | BIC | | | | 9254.79 | BIC | | | 8263.42 |

*** p < 0.01, ** p < 0.05, * p < 0.1 – SE: Standard Error – SD: Standard Deviation BIC: Bayesian Information Criterion

Reference levels: Treatment type: Anti-depressants – waiting time: no waiting time (immediate start) – number of visits: one visit (upon diagnosis) – side-effects: no side-effects

The sign of the estimated standard deviations is irrelevant: interpret them as being positive

## 5.9 Willingness to Pay (WTP)

Results for estimating the WTP space models are shown in **Table 5.15.** On average, individuals in both samples are willing to pay substantial amounts to avoid sexual side-effects ($147 in DCE 1 and $199 in DCE 2) weight-gain ($107 in DCE 1 and $130 in DCE 2) and gastrointestinal side-effects ($105 in DCE 1 and $171 in DCE 2). Overall, those not currently receiving treatment are willing to pay more to avoid side-effects than those who are currently undertaking treatment. Respondents are willing to pay higher amounts for an effective treatment, and lower amounts for treatments with 3 months of waiting time ($49 less for DCE 1 and $72 less for DCE 2) compared to no waiting time. Respondents are willing to pay more for a treatment that includes several visits to the specialist/GP (e.g., $49 for DCE 1 and $55 for DCE 2, for a treatment that includes 16 visits).

The results of the WTP space model and the preference space model (see Table 5.2) are overall consistent, with a few exceptions. Unlike the preference space model, the WTP model indicates that individuals in both DCEs are not willing to pay more for a combination treatment. WTP results also show that respondents in DCE 1 are willing to pay less for a waiting time of 3

months only (but not for a waiting time of 2 weeks or 1 month) and are willing to pay more to have 16 visits with a specialist (but not 10 visits).

It is worth noting that differences in preference results are expected between the two approaches. The implied distributions on preferences from the WTP model are often different from those specified in the preference space model. For instance, a log-normal cost distribution and a normal WTP distribution implies that the preference distribution is the product of a normal and log-normal, which can be very different from the normal distribution typically specified in the preference space model (Train & Weeks, 2005).

Consistent with the literature, our results suggest that the preference-space model has a better model fit. The BIC in the preference space model for both DCEs is smaller than that of the WTP space model (9,094.79 < 9,190.57 for DCE 1 and 8,099.38 < 8,364.58 for DCE 2).

*Table 5.15. Willingness to Pay (WTP) space model estimates - DCE 1 & DCE 2*

| Attribute | Level | DCE 1 | | | | DCE 2 | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | SE | SD | SE | Mean | SE | SD | SE |
| Treatment type | Psychotherapy | 10.159 | 15.483 | -103.968 *** | 6.881 | 56.412 *** | 15.515 | -115.807 *** | 9.694 |
| | Combination | 10.893 | 13.995 | -50.918 *** | 4.789 | 20.763 | 13.688 | -95.744 *** | 7.678 |
| Waiting time | 2 weeks | -8.584 | 8.377 | 39.040 *** | 8.660 | -16.656 ** | 8.318 | 5.540 | 13.213 |
| | 1 month | -7.123 | 8.515 | -19.177 ** | 9.361 | -8.496 | 10.352 | -46.801 *** | 13.848 |
| | 3 months | -48.930 *** | 8.349 | 54.300 *** | 8.759 | -72.397 *** | 8.385 | 50.784 *** | 13.191 |
| Number of visits | 4 visits | 9.768 | 13.342 | -36.879 *** | 5.621 | 34.993 *** | 11.268 | -17.905 | 11.002 |
| | 10 visits | 24.438 | 15.499 | -0.899 | 5.235 | 48.549 *** | 13.452 | 30.618 ** | 13.941 |
| | 16 visits | 49.265 *** | 17.149 | 45.679 *** | 10.088 | 55.418 *** | 13.598 | -72.216 *** | 11.448 |
| Side-effects | Sexual | -147.252 *** | 13.690 | -58.475 *** | 8.141 | -199.141 *** | 14.408 | 158.981 *** | 14.594 |
| | Weight | -107.014 *** | 12.251 | -64.594 *** | 9.850 | -130.128 *** | 12.945 | 96.716 *** | 15.332 |
| | Gastrointestinal | -105.648 *** | 13.134 | 64.455 *** | 14.222 | -171.678 *** | 14.657 | -140.786 *** | 17.358 |
| | Sleep | -83.049 *** | 11.579 | -45.875 *** | 8.838 | -60.207 *** | 10.630 | 96.124 *** | 11.621 |
| | Fatigue | -47.744 *** | 10.612 | 9.895 | 12.607 | -30.336 *** | 9.400 | -44.211 *** | 12.836 |
| Effectiveness | Effective | 1.014 *** | 0.068 | 0.684 *** | 0.036 | 0.894 *** | 0.073 | 0.848 *** | 0.058 |
| Cost | Cost | -4.125 *** | 0.081 | 1.211 *** | 0.092 | -4.289 *** | 0.055 | 0.459 *** | 0.061 |
| Constant | asc1 | -99.638 *** | 11.995 | 69.223 *** | 5.312 | 111.518 *** | 11.641 | 37.288 *** | 8.363 |
| | asc2 | -108.240 *** | 13.020 | -71.170 *** | 7.728 | 88.739 *** | 11.893 | 40.499 *** | 7.187 |

| | | | | |
|---|---|---|---|---|
| | Observations | 17,424 | Observations | 17,136 |
| | Log Likelihood | -4429.26 | Log Likelihood | -4016.56 |
| | BIC | 9190.57 | BIC | 8364.58 |

*** p < 0.01, ** p < 0.05, * p < 0.1 – SE: Standard Error – SD: Standard Deviation BIC: Bayesian Information Criterion

Reference levels: Treatment type: Anti-depressants– waiting time: no waiting time (immediate start) – number of visits: one visit (upon diagnosis) – side-effects: no side-effects

The sign of the estimated standard deviations is irrelevant: interpret them as being positive

## 5.10 Relative Importance

Attributes' relative importance (or rank) was identical for both DCEs. Results are shown in **Fig. 5.1**. Cost is the attribute of greatest importance on choice, followed by effectiveness, side-effects, waiting time, number of visits and treatment type. The strength of the relative

importance seems to be somewhat different between samples. Side-effects and effectiveness seem to have a closer relative importance in DCE 2 compared to DCE 1. The similar relative importance between effectiveness and side-effects (for individuals not currently receiving treatment) might indicate that these people have experienced severe side-effects in their previous treatments, hence why they stopped treatment. The difference in rank between waiting time and number of visits is also smaller in DCE 2.

*Figure 5.1 Relative Importance based on Mixed Logit Model – DCE 1 & DCE 2*
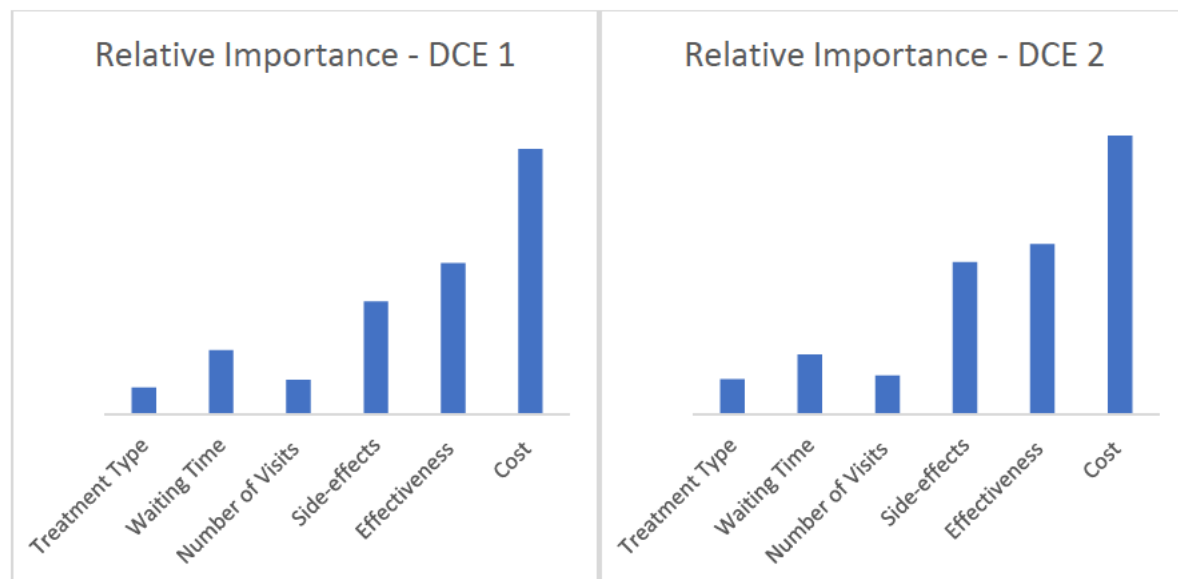


Relative importance was calculated using the range method, by subtracting the highest utility from the lowest utility of an attribute level, and dividing it but the sum of all attribute differences

# 6. Discussion

To our knowledge, this study is the first to explore depression treatment preferences using stated preference approach for the clinically depressed population in Australia. It adds upon the current knowledge of patient preferences and explores new multi-dimensional aspects that affect choices. We have also made a novel contribution by using the HLQ to understand how health literacy strengths and weaknesses for clinically depressed people could play a role in patients' treatment choices. This study can therefore explain an additional pathway of how health literacy could affect health outcomes, by exploring the associations between health literacy treatment preferences.

Overall, all treatment attributes in this study are predictors of choice for depression treatment. The attributes that had the biggest impact on treatment choice were cost, followed by effectiveness and side-effects. Our results suggest treatment cost reduction should be prioritised, as high costs are one of the biggest barriers for depression treatment in Australia (Ride & Lancsar, 2016). Out of pocket-costs for mental health treatment remain high; one 50-minute session with a clinical psychologist could cost up to $230 (APS, 2021), but only up to $129.55 is covered by Medicare (Department of Health, 2022b). This can leave a patient with an out-of-pocket cost of $100.45 per session of treatment. Costs could be substantially higher when treatment includes more than 20 sessions, anti-depressants, mental health plan review with a GP, or seeing a psychiatrist.

People diagnosed with depression prefer treatments with shorter waiting times and are willing to pay more to avoid a treatment with a waiting time of 3 months. Preference for shorter waiting times prior to the start of treatment is consistent with the DCE findings of Burge et al. (2004) and Lokkerbol et al. (2019). Despite the expansion in mental health services in Australia during the Covid-19 pandemic (e.g., tele-health) (Snoswell et al., 2020), shortages in mental health providers relative to increased demand meant more people were waiting longer for treatment. Our study results suggest highly literate individuals may experience less disutility from longer waiting times compared to those who are moderately literate. One potential reason is that high literate people might be willing to trade-off waiting times for a good health outcomes, while lower health literate people could be less patient to see a specialist (Levy & Janke, 2016).

People prefer anti-depressants that do not cause any side-effects and are willing to pay more to avoid these adverse effects. This is consistent with the results of a previous studies (Morey et al., 2007; Wouters et al., 2014). However, these studies lacked the inclusion of all categories

of side-effects that were identified in our study. Sexual side-effects, weight gain and gastro-intestinal side-effects are the least preferred side-effects. Both males and females are found to disfavour treatments that cause sexual dysfunction. This is consistent with previous studies that found similar preference magnitudes for both genders for a treatment that caused an inability to orgasm (Morey et al., 2007). Interestingly, females with current treatment experience disfavour sexual side-effects more strongly than males. There is no gender difference however, between males and female who are not currently receiving any treatments. This could highlight the importance of current experience on treatment preferences. The significant willingness to pay amounts to avoid adverse effects highlight the potential for pharmaceutical companies to invest in pharmacotherapy treatments that cause fewer or less severe side-effects. With the stigma and negative perceptions about psychiatric medications, health care providers prescribing anti-depressants must not only discuss potential side-effects, but also the severity and duration that could affect people differently.

Similar to the results of Muntingh et al. (2019), people prefer visiting their specialist/ GP several times during the course of treatment, as opposed to one visit upon diagnosis. This could reflect the time trade-offs that individuals are willing to make for a better health outcome, or an understanding that it often takes several treatment sessions for improved health outcomes. However, the marginal benefit from extra visits may diminish, since there was no statistically significant difference between 10 and 16 visits.

Even though treatment type is found to be the least important attribute that affects choices, there is a stronger story for treatment type preferences within sub-groups. Females who are not currently getting treatment have a higher preference for psychotherapy compared to anti-depressants. This is consistent with previous studies that found that females are more likely than males to prefer psychotherapy (Churchill et al., 2000; Dwight-Johnson et al., 2000; Khalsa et al., 2011). While there is some statistical significance that men prefer anti-depressants, non-binary people strongly disfavour receiving psychotherapy alone compared to anti-depressants. One potential reason could be that non-binary people cannot find therapists that identify with their gender, in addition to the high levels of stigma non-binary individuals face (Scandurra et al., 2019). Men's preference for receiving anti-depressants is also consistent with previous studies (Dwight-Johnson et al., 2010; Houle et al., 2013), where they are less likely to choose a treatment that requires talking to a therapist. Treatment type preferences across sub-groups are different in DCE 1 and DCE 2. For those currently undertaking treatment, individuals in clusters 2 and 3 (overall moderate and low health literacy scores) prefer receiving a

combination treatment. On the contrary, for those who are not currently receiving treatment, individuals with high health literacy were found to prefer combination treatments and psychotherapy over anti-depressants. Health literacy patterns indicate that cluster 1 of DCE 2 is the only cluster who has some strengths in the ability to find good health information. This health literacy domain strength could be driving their preferences for treatment type that worked best for them during their previous treatments. Low health literate people that are currently undertaking treatment are also the only cluster that have strength in appraisal of health information. This could also be driving their preferences towards the clinically preferred treatment in terms of effectiveness, which is the combination treatment.

For those who are not currently undertaking treatment, high and moderate literate people were more likely to prefer more effective treatments than lower health literate individuals. Overall, there is evidence that everyone is willing to pay more for an effective treatment. Surprisingly, for those currently undertaking treatment, those with an overall low health literacy score value treatment effectiveness more than the those with higher health literacy levels. One potential reason for this could be that people with low health literacy have unrealistic expectations about their treatments (Adams et al., 2016). These individuals might undertake treatment expecting that it is always going to be effective for everyone, regardless of one's depression severity, treatment intensity or adherence. This is not the case for individuals who are not currently undertaking treatment. Our data shows that 92.2% of individuals in DCE 2 have already received treatment in the past. This could indicate that these patients already have realistic expectations and knowledge about effectiveness of treatments. Another possible explanation for low health literate individuals to prefer highly effective treatments is their health literacy strengths. Feeling understood and supported by health care providers, understanding health information well enough to know what to do and good appraisal of health information could all drive the preferences of lower health literate individuals to favour effective treatments.

These results highlight a novel contribution of this study, which is that treatment preferences differ between people who have current treatment experience and people who don't. Respondents who are not currently receiving treatment may have dropped out because treatment was expensive, not effective, or because it resulted in adverse side effects. This is suggested by the preferences and relative importance for these treatment attributes, especially for people not receiving treatment.

A different treatment strategy may therefore be required to re-engage those who dropped out of treatment. Improving health literacy, as some have suggested, may not re-engage them and bring them back into the system. This is shown by the different preferences for high literacy respondents across the both samples. Therefore, treatment may need to become more effective and side-effects may need to be reduced for these people to start treatment again. Alternatively, health care providers may need to manage the trade-offs between effectiveness and side effects before these people drop out.

A common trend for most health literacy clusters in this study is that individuals with depression generally have lower scores on social support for health irrespective of their overall health literacy score (i.e., high, moderate or low). This highlights the challenges that individuals with mental illness may experience. Previous studies show that social support is associated with a better treatment outcomes (Zhou et al., 2017). Lack of social support could be due to stigma and lack of awareness about mental health. Lower scores on navigating the health care system across all health literacy profiles are also alarming since people with mental illness are likely to have complex needs that require a range of services (e.g., GP, psychologist, psychiatrist) (Brophy et al., 2014). This is particularly important to explore further as individuals with mental health conditions are more likely to have comorbidities (Himmerich et al., 2008), increasing the complexity of care they need. These weaknesses in health literacy highlight barriers for treatment for people diagnosed with depression. These results confirm that using a multidimensional health literacy measure is an informative tool for health providers and policy makers. It ensure these individuals can get their needs met by identifying the best ways to intervene to improve health-literacy related outcomes (Beauchamp et al., 2015).

## 6.1 Study Strengths

The use of a discrete choice experiment to elicit preferences is superior to other preference eliciting techniques used in mental health studies. DCEs are in line with consumer theory and can quantify trade-offs that individuals make across several attributes. This avoids the bias that results from contingent valuations, where individuals trade off a bundle of characteristics rather than separate attributes. Using a DCE means that preferences for depressed individuals can be quantified, unlike most qualitative depression treatment studies. The advanced econometric model used in our DCE (i.e., mixed logit model) allows to explore observed and unobserved heterogeneity, rank the importance of treatment attributes and calculate the willingness to pay for a change in attribute levels (e.g., from worst level to best level). A failure to capture heterogeneity across people will result in biased preference estimates. Using the mixed logit

model has therefore provided a better model fit (compared to the conditional logit model), with its ability to identify taste heterogeneity and potential attributes distribution.

This study includes comprehensive attributes and levels for depression treatment preferences. For instance, this is the first stated preference study that includes five categories of side-effects, number of visits to the specialist (as per the mental health plan required by Medicare), and out-of-pocket costs given the possible Medicare rebates for these treatments. This is also one of the few studies that considered number of visits as an attribute that could affect choice. Therefore, the strength of this DCE is the choice of attributes impact real-life choices.

Another unique contribution is that it assessed multidimensional measures of health literacy and their effect on treatment preferences. While most previous studies focused on subgroup analysis with demographic characteristics only, this study explored the role of understanding and accessing health care information in treatment preferences. This provides a better understanding of the facilitators and barriers that individuals might face when deciding on their treatments.

Another significant strength is that only clinically depressed individuals were included in this study. Most studies focus on mental health in general, or recruit respondents who are not necessarily clinically diagnosed with depression. This is problematic as the preferences for those who experience depression first-hand could be significantly different than those who are asked to imagine having depression. This study has also separated depressed individuals who are currently receiving treatments from those who were previously diagnosed with depression but are not currently receiving treatment. As shown by the different results in both DCE versions, these two samples have somewhat different preferences. To our knowledge, this is the first study that conducts two DCEs for two separate samples of clinically depressed people. This is essential to consider since those who are currently experiencing treatment and interacting with the health care system could have different preferences than those who do not receive treatment.

## 6.2 Study Limitations and Future Research

Respondents in this study were recruited in Australia, which limits these findings' generalisability in other countries. A limitation to this study was that data was collected through an online research panel and other mental health organisations via social media, e-mails and newsletters, which resulted in a younger, lower income sample than the general Australian population. Therefore, this study does not elicit the preferences for the older generations or

high-income earners, which might have different preferences than the samples in this study. Future studies could increase the sample size to ensure their sample is more representative of the population. A larger sample size would have provided more insightful information about those in cluster 3 (low literacy cluster). Sample size for individuals who have overall low health literacy pattens was low in both DCEs, causing some of the sub-group analysis results to be insignificant.

Whether or not individuals reveal their true preferences remains a limitation in DCEs, as there is no conclusive evidence that all the choices respondents make are rational (Lancsar & Louviere, 2006). Despite using a dominance test in our DCE, if people randomly made their choices across scenarios, preference coefficients could still be biased. This is also related to hypothetical bias in DCEs, where individuals' preferences do not necessarily reflect their true choices in a real-life.

The analysis of this study excludes some important factors that can potentially affect treatment preferences for depression. These factors could include depression severity, health and mental health comorbidities and most importantly, mental health beliefs. This information has already been collected in this study, but will be further explored in the future.

Attribute interactions will also be explored in the future, where the preference of one attribute could depend on the preference for another attribute. For instance, it is expected that the preference for side-effect would depend on the preference for treatment effectiveness. Including attribute interactions will overcome any biased estimates resulting from the main-effects design. Future studies should more comprehensively explore different sources of heterogeneity.

## 7. Conclusion

Preferences for cheaper treatments highlight the need to reduce fees for mental health treatments in Australia. The predictors of choice in this study could partially explain the lack of appropriate uptake of treatments for depression. For instance, shorter waiting times and lower costs could reduce treatment barriers. Preference heterogeneity is complex, emphasizing the fact that 'one does not fit all'. Health care providers must be aware of the different factors impacting preferences. This study also highlights the need to prioritise strengthening two health literacy dimensions for individuals diagnosed with depression: (1) social support for health, and (2) navigating the health care system. Improving these health literacy dimensions would result in individuals being able to be socially supported and confidently act on their own, at the

system and service level. Improving the quality of treatment offered for people with depression by tackling their needs and preferences could ultimately result in better health outcomes, reduced suicide rates and increased productivity.

# Appendix 1 – The Survey

Patient Choice Survey

**Sections:**

1. Welcome, explanatory statement and consent
2. Screening Questions
3. DCE setup and related questions
4. DCE tasks
5. Health Literacy (HLQ)
6. Patient Health Questionnaire (PHQ-9)
7. Mental health beliefs
8. Other questions about you

| Section | Content |
|---|---|
| 1<br>Welcome,<br>explanatory<br>statement<br>and consent | *Patient choice of treatment of depression*<br><br>To find more about this study, please read the participant information statement below.<br><br>**Participant Information and Consent Form**<br><br>You are invited to participate in a study about making choices for treating depression. The purpose is to investigate whether health literacy and beliefs about mental health treatment affect how people choose between anti-depressant medication and psychotherapy for depression treatment. This study is expected to help health care providers improve treatment adherence and persistence for patients. It may also be used by the Australian Government to improve its health literacy campaigns.<br><br>The study is being conducted by Ms. Noura Saba to meet the requirements of her Master of Research Degree under the supervision of Professor Henry Cutler and Dr. Yuanyuan Gu at Macquarie University Centre for the Health Economy (MUCHE) and Professor Viviana Wuthrich at Centre for Emotional Health. If you have any questions related to this study, please contact Ms Noura Saba on noura.saba@mq.edu.au.<br><br>If you decide to participate, you will be asked to complete an online survey, where you will be asked to choose the most and least preferred treatment option among a set of hypothetical treatments for depression. You will be asked questions that determine your health literacy and asked to undertake the Patient Health Questionnaire (PHQ-9), which will be used to understand what symptoms of depression you experience and how these symptoms have been for you recently. You will also be asked about your beliefs about mental health treatment and some socio-demographic questions. The survey will take approximately 25 minutes to complete.<br><br>To be eligible to participate in this study, you have to be (1) at least 18 years of age, (2) diagnosed with depression (by a specialist/ GP) in the past 5 years, and (3) a Medicare card holder.<br>When answering questions about your experience of depression and treatments, you might or might not have received, it is possible that you might experience some distress. We anticipate that any distress will be mild to moderate, and dissipate quickly. If you think that you are likely to be significantly distressed by reflecting on your depression, we |

recommend that you don't complete the survey. If you do feel distressed, you are free to skip questions and/or end the survey. If you continue to experience distress related to the study, please contact your local General Practitioner, or Beyond Blue at https://www.beyondblue.org.au/about-us/contact-us, calling the Mental health line at 1800 011 511 or Lifeline at 13 11 14 (24 hours a day/ 7 days a week). If you are in crisis, please present to your emergency department.

**Upon completing the survey, you will be offered the chance to enter a draw to win one of three $200 Woolworths vouchers.**

Any information gathered from the study will be kept confidential on secure servers, except as required by law. No individual will be identified in any publication of the results.  Only the investigators will have access to the collected data. A publication resulting from this study can be made available to you on request by contacting Professor Henry Cutler at health.economy@mq.edu.au.

Participation in this study is entirely voluntary. You are not obliged to participate and if you decide to participate, you are free to withdraw at any time without having to give a reason and without consequence.
If you consent to participate in this study, please click "I agree to participate". Otherwise, please click "Exit". Please print this page if you'd like a copy.

The ethical aspects of this study have been approved by the Macquarie University Human Research Ethics Committee. If you have any complaints or reservations about any ethical aspect of your participation in this research, you may contact the Committee through the Director, Research Ethics & Integrity (telephone (02) 9850 7854; email ethics@mq.edu.au). Any complaint you make will be treated in confidence and investigated, and you will be informed of the outcome.

**[I AGREE to participate, and I CONFIRM that I meet all the eligibility criteria: (1) I am at least 18 years of age, (2) I have been diagnosed with depression (by a specialist/ GP) in the past 5 years, and (3) I have Medicare. If you don't meet these criteria, please Exit the survey.]**
**[Exit]**

| | |
|---|---|
| 2<br>Screening<br>Questions | Are you at least 18 years of age?<br>1. Yes **[move to question xx]**<br>2. No **[end of survey – exit message]** |

| | |
|---|---|
| | **Exit message: Thank you for your interest in participating in this study, we appreciate your willingness to volunteer. Your responses indicate that you do not meet our study criteria, and as such, the survey has now ended. We want to remind you that if you are feeling distressed, please seek further assistance by contacting your local GP or Beyond Blue at https://www.beyondblue.org.au/about-us/contact-us, calling the Mental health line at 1800 011 511 or Lifeline at 13 11 14 (24 hours a day/ 7 days a week). If you are in crisis, please present to your emergency department.** |
| 2<br>Screening<br>Questions | Which of the following statements best describes you?<br>1. I have been diagnosed (by a specialist or GP) with depression during the past 5 years **[move to question xx]**<br>2. I have been diagnosed (by a specialist or GP) with depression more than 5 years ago **[end of survey – exit message]**<br>3. I have not been diagnosed (by a specialist or GP) with depression **[end of survey – exit message]** |
| 2<br>Screening<br>Questions | Do you have Medicare?<br>1. Yes **[move to question xx]**<br>2. No **[end of survey – exit message]** |
| 2<br>Screening<br>Questions | Have you received a treatment for your depression in that past 4 weeks?<br>1. Yes **[move to survey Version 1]**<br>2. No |
| 2<br>Screening<br>Questions | Have you received treatment for depression in the past 5 years?<br>1. Yes **[move to survey Version 2]**<br>2. No **[move to survey Version 3]** |
| 3<br>DCE<br>setup | Thank you for agreeing to participate in this study. The outcome of the research will be used to improve future treatment for depression so please consider your response to the questions in this survey carefully. |
| 3<br>DCE<br>setup | Within this survey, we will describe different treatment options to you using six factors and ask you to choose your preferred treatment option. **You should consider all factors when making a choice. The next section within this survey defines each factor so please take the time to read them. You can also refer to these definitions when making your choice.** |
| 3<br>DCE<br>Factor 1: | The first factor is<br>**Treatment Type**<br>which describes the type of treatment that you choose to treat your depression. It can be described using three levels: |

| | |
|---|---|
| Treatment Type | • Anti-depressant medication<br>• Psychotherapy (e.g., talking to a psychologist or psychiatrist)<br>• Combination of anti-depressant medication and psychotherapy |
| 3<br>DCE<br>Factor 2:<br>Cost | The second factor is<br>**Out-of-pocket cost**<br>which describes the *total* out-of-pocket amount that you have to pay per week for your treatment. If you receive a combination treatment that includes going to a GP and visiting a therapist, along with taking medication, this would describe the total cost of all treatments combined. It can be described using seven levels:<br><br>• $0 per week<br>• $2 per week (for your treatment duration)<br>• $10 per week (for your treatment duration)<br>• $30 per week (for your treatment duration)<br>• $80 per week (for your treatment duration)<br>• $150 per week (for your treatment duration)<br>• $350 per week (for your treatment duration) |
| 3<br>DCE<br>Factor 3:<br>Effectiveness | The third factor is<br>**Effectiveness**<br>Which describes the number of people out of 100 **who will report significant levels of symptom improvement**. Effectiveness can be described using four levels:<br>• 15 people for every 100 people treated<br>• 40 people for every 100 people treated<br>• 55 people for every 100 people treated<br>• 75 people for every 100 people treated |
| 3<br>DCE | The fourth factor is |

| | |
|---|---|
| Factor 4:<br>Waiting time to start treatment | **Waiting time to start treatment**<br>which describes how long you have to wait after your diagnosis until your specialist is _available_ to start your treatment. It can be described using four levels:<br>• No waiting time (Immediate start)<br>• 2 weeks<br>• 1 month<br>• 3 months |
| 3<br>DCE<br>Factor 5:<br>Number of Visits | The fifth factor is<br> **Number of visits**<br>which describes how many times you visit your health specialist during the course of your treatment. If you receive a combination treatment that includes going to a GP and visiting a therapist, this would describe the total number of visits of both treatments combined It can be described using four levels:<br>• Only one visit (upon assessment/diagnosis)<br>• Four visits (1 visit per week)<br>• Ten visits (1 visit per week)<br>• Sixteen visits or more (1 visit per week) |
| 3<br>DCE<br>Factor 6: Adverse Side-effects | The sixth factor is<br>**Adverse Side-effects**<br>which describes **the most distressing side-effect** that you may experience as a result of your treatment. Side-effects can be described using six levels:<br>• No side-effects<br>• Sexual dysfunction (e.g., inability to orgasm, loss of libido)<br>• Weight gain/ increased appetite<br>• Gastrointestinal side-effects (e.g., Nausea, vomiting, diarrhea, abdominal pain)<br>• Sleep disturbances (e.g., Insomnia)<br>• Fatigue/ tiredness |
| 3 | Great! You now have learned about these factors. Next, we will ask about your current treatment based on these factors. |

| | |
|---|---|
| End of factor explanation | |
| 3<br><br>Information<br><br>about Current<br><br>Mental Health<br><br>Treatment | Which type of treatment are you currently receiving?<br>1. Anti-depressant medications<br>2. Psychotherapy (e.g., talking to a psychologist or psychiatrist)<br>3. Combination of anti-depressant medication and psychotherapy |
| 3<br><br>Information<br><br>about Current<br><br>Mental Health<br><br>Treatment | How much do you pay (out-of-pocket) per week for your current treatment? If you receive a combination treatment that includes going to a GP and visiting a therapist, along with taking medication, this would describe the total cost of all treatments combined. _____ |
| 3<br><br>Information<br><br>about Current<br><br>Mental Health<br><br>Treatment | How long did you have to wait to start your current treatment? This describes how long you waited from the day of your diagnosis until your specialist was _available_ to start your treatment.<br>1. No waiting time (Immediate start)<br>2. Less than or equal to 2 weeks<br>3. More than 2 weeks and less than or equal to 1 month<br>4. More than 1 month |
| 3<br><br>Information<br><br>about Current | How many visits to your health specialist do you expect will be required throughout the course of your treatment plan? |

| | |
|---|---|
| Mental Health Treatment | If you receive a combination treatment that includes going to a GP and visiting a therapist, this would describe the total number visits of both treatments combined.<br><br>If you expect to visit your specialist on an ongoing basis, please write 'ongoing' _____ |
| 3<br>Information about Current Mental Health Treatment | Which is the _most distressing_ side-effect caused by your current treatment?<br>1. No side-effects<br>2. Sexual dysfunction (e.g., inability to orgasm, loss of libido)<br>3. Weight gain/ Increased appetite<br>4. Gastrointestinal side-effects (e.g., Nausea, vomiting, diarrhea, abdominal pain)<br>5. Sleep disturbances (e.g., Insomnia)<br>6. Fatigue/ tiredness |
| 3<br>DCE practice | We are now going to provide you with some treatment scenarios where we ask you to choose your most preferred and least preferred treatment options.<br><br>First, reflect on your current diagnosis of depression and your current treatment. **Now imagine your GP or specialist has recommended 3 treatment options from which you can choose, one of which is your current treatment.**<br><br>We will now present you with several treatment scenarios. Each treatment scenario will include your current treatment based on your answers to the previous survey questions and 2 additional treatment options.<br><br>We know that you may not remember all the factors we previously described, so **if you need to remind yourself what each factor means, you can simply hover over the name of each factor in each scenario and it will provide you with further information**.<br><br>Each scenario will contain three treatment options labelled "Treatment A", "Treatment B", and "Current treatment". Each treatment will be described by the factors we have explained.<br>The descriptions of "Treatment A" and "Treatment B" will CHANGE across the scenarios. The description of "Current Treatment" will remain the same throughout the scenarios as this relfects the treatment you are currently receiving. |

| | In each scenario, you will be asked to choose the most preferred (best) and least preferred (worst) options among the three treatments. **Please assume the treatment options in each scenario are identical in all respects except those explicitly stated.**<br><br>These scenarios are imaginary. There are no right or wrong answers. |
|---|---|
| 3<br>DCE<br>Scenario Example | Now, let's start the choice task!<br>**Remember, if you cannot remember what each factor means, please hover over its name.**<br>**Please assume the treatments are identical in all respects except those explicitly stated within the scenario.**<br><br><table><tr><th>Factors</th><th>A</th><th>B</th><th>Current Treatment</th></tr><tr><td>Treatment type</td><td>Psychotherapy (e.g., talking to a psychologist or psychiatrist)</td><td>Anti-depressant medication</td><td>Your current treatment type</td></tr><tr><td>Out-of-pocket cost</td><td>$150 per week (for your treatment duration)</td><td>$30 per week (for your treatment duration)</td><td>Your current treatment cost</td></tr><tr><td>Waiting time</td><td>2 weeks</td><td>No Waiting Time (Immediate Start)</td><td>The time you had to wait before starting your current treatment</td></tr><tr><td>Number of visits</td><td>10 visits (1 visit per week)</td><td>Only one visit (upon assessment/ diagnosis)</td><td>The number of visits needed for your current treatment</td></tr><tr><td>Adverse side- effects</td><td>None</td><td>Weight gain/ increased appetite</td><td>Your current most-distressing side-effects</td></tr><tr><td>Effectiveness</td><td>55 people for every 100 people treated</td><td>55 people for every 100 people treated</td><td>The number of people out of 100 who will report significant levels of symptom improvement</td></tr></table> |

| | | | | |
|---|---|---|---|---|
| | **Please choose your most preferred (best) treatment amongst all three options** | **Treatment A** | **Treatment B** | **My Current Treatment** |
| | **Please choose your least preferred (worst) treatment amongst all three options** | **Treatment A** | **Treatment B** | **My Current Treatment** |

| | |
|---|---|
| 4<br>DCE questions | The first set of DCE choice tasks |
| 4<br>DCE questions<br>'half way' text | You are doing really well. Although the options may look very similar from scenario to scenario, please keep carefully considering the options because the descriptions of treatment A and B are changing. |
| 4<br>DCE questions | The second set of DCE choice tasks |
| 4<br>DCE questions<br>'end' text | That is the end of the choice task. |
| 5<br>Health Literacy | We now want to learn about how you find, understand and use health information, and how you manage your health and interact with doctors and other healthcare providers. In the following questions, the term healthcare providers means doctors, nurses, physiotherapists, dieticians and any other health worker you seek advice or treatment from.<br><br>Health Literacy Questionnaire (HLQ)  - Swinburne University is the owner of the Intellectual Property Rights of the Licensed material of the HLQ. |

| | |
|---|---|
| 6<br><br>Current Depression Severity | Sometimes depression severity will impact treatment choices. We would now like to measure your current depression severity. In the following set of questions, please indicate your response to each question on a scale from one 'not at all' to four 'nearly every day'.<br><br>Patient Health Questionnaire (PHQ-9)<br><br>Note: We did not use the data of the PHQ-9 in this thesis |
| 7<br><br>Mental health Beliefs<br><br>(Negative Beliefs about Mental Health Treatment) | In the following set of questions, please indicate how strongly you disagree or agree with these statements. The statements will describe general beliefs and perceptions about mental health treatment and mental health help-seeking behaviours.<br><br>Medications for mental health problems are ineffective<br><br>1.     Strongly Disagree<br>2.     Disagree<br>3.     Neither agree nor disagree<br>4.     Agree<br>5.     Strongly Agree |
| 7<br><br>Mental health Beliefs<br><br>(Negative Beliefs about Mental Health Treatment) | Mental health treatment just makes things worse.<br><br>1.     Strongly Disagree<br>2.     Disagree<br>3.     Neither agree nor disagree<br>4.     Agree<br>5.     Strongly Agree |

| 7 Mental health Beliefs (Negative Beliefs about Mental Health Treatment) | Mental health providers don't really care about their patients<br><br>1. Strongly Disagree<br>2. Disagree<br>3. Neither agree nor disagree<br>4. Agree<br>5. Strongly Agree |
|---|---|
| 7 Mental health Beliefs (Negative Beliefs about Mental Health Treatment) | Mental health treatment generally does not work<br><br>1. Strongly Disagree<br>2. Disagree<br>3. Neither agree nor disagree<br>4. Agree<br>5. Strongly Agree |
| 7 Mental health Beliefs (Negative Beliefs about Mental | Therapy/counselling does not really help for mental health problems<br><br>1. Strongly Disagree<br>2. Disagree<br>3. Neither agree nor disagree<br>4. Agree<br>5. Strongly Agree |

| | |
|---|---|
| Health Treatment) | |
| 7 Mental health Beliefs (Negative Beliefs about Mental Health Treatment) | Mental health treatment often requires treatments people don't want<br><br>1. Strongly Disagree<br>2. Disagree<br>3. Neither agree nor disagree<br>4. Agree<br>5. Strongly Agree |
| 7 Mental health Beliefs (Negative Beliefs about Mental Health Treatment) | Medications for mental health problems have too many negative side-effects<br><br>1. Strongly Disagree<br>2. Disagree<br>3. Neither agree nor disagree<br>4. Agree<br>5. Strongly Agree |
| 7 Mental health Beliefs | Medications for mental health problems are addictive<br><br>1. Strongly Disagree<br>2. Disagree<br>3. Neither agree nor disagree |

| | |
|---|---|
| (Negative Beliefs about Mental Health Treatment) | 4.     Agree<br>5.     Strongly Agree |
| 7<br>Mental health Beliefs<br>(Negative Beliefs about Mental Health Treatment) | Mental health providers stereotype patients based on race, sex, etc<br><br>1.     Strongly Disagree<br>2.     Disagree<br>3.     Neither agree nor disagree<br>4.     Agree<br>5.     Strongly Agree |
| 7<br>Mental health Beliefs<br>(Negative Beliefs about Treatment-Seeking) | A problem has to be really bad to seek mental health care<br><br>1.     Strongly Disagree<br>2.     Disagree<br>3.     Neither agree nor disagree<br>4.     Agree<br>5.     Strongly Agree |
| 7<br>Mental health Beliefs | Seeing a mental health provider makes me feel weak<br><br>1.     Strongly Disagree<br>2.     Disagree |

| | |
|---|---|
| (Negative Beliefs about Treatment-Seeking) | 3.     Neither agree nor disagree<br>4.     Agree<br>5.     Strongly Agree |
| 7<br><br>Mental health Beliefs<br>(Negative Beliefs about Treatment-Seeking) | I feel uneasy talking with a mental health provider<br><br>1.     Strongly Disagree<br>2.     Disagree<br>3.     Neither agree nor disagree<br>4.     Agree<br>5.     Strongly Agree |
| 7<br><br>Mental health Beliefs<br>(Negative Beliefs about Treatment-Seeking) | I prefer to deal with mental health problems myself<br><br>1.     Strongly Disagree<br>2.     Disagree<br>3.     Neither agree nor disagree<br>4.     Agree<br>5.     Strongly Agree |
| 7<br><br>Mental health Beliefs | Most mental health problems can be handled without professional help<br><br>1.     Strongly Disagree<br>2.     Disagree<br>3.     Neither agree nor disagree<br>4.     Agree<br>5.     Strongly Agree |

| | |
|---|---|
| (Negative Beliefs about Treatment-Seeking) | |
| 7<br><br>Mental health Beliefs<br><br>(Negative Beliefs about Treatment-Seeking) | When I seek mental health treatment, I feel stupid for not handling the problem myself<br><br>1.      Strongly Disagree<br>2.      Disagree<br>3.      Neither agree nor disagree<br>4.      Agree<br>5.      Strongly Agree |
| 7<br><br>Mental health Beliefs<br><br>(Negative Beliefs about Treatment-Seeking) | I don't want to share personal information with a mental health provider.<br><br>1.      Strongly Disagree<br>2.      Disagree<br>3.      Neither agree nor disagree<br>4.      Agree<br>5.      Strongly Agree |
| 8<br><br>Other questions<br><br>About you | Are you?<br>1.  Male or man<br>2.  Female or woman<br>3.  Non-binary<br>4.  [I/ They] use a different term **[please specify ___]** |
| 8 | |

| | |
|---|---|
| Other questions<br><br>About you | How old are you?<br><br>__ **[Answer required]** |
| 8<br><br>Other questions<br><br>About you | Are you Indigenous Australian or Torres Strait Islander?<br><br>1. Yes **[move to question xx]**<br>2. No **[move to question xx]** |
| 8<br><br>Other questions<br><br>About you | Which ethnic group do you identify with?<br><br>1. Australian<br>2. New Zealander<br>3. Asian<br>4. Indian<br>5. Middle Eastern<br>6. European<br>7. North American<br>8. South American<br>9. African<br>10. Other **[Please specify _____]** |
| 8<br><br>Other questions<br><br>About you | Which best describes your marital status?<br><br>1.  Married or living with partner (de facto relationship)<br>2.  Widowed<br>3.  Divorced<br>4.  Separated<br>5.  Never married |

| | |
|---|---|
| 8<br><br>Other questions<br><br>About you | Which State or Territory do you live in?<br><br><br>1. Australian Capital Territory<br>2. New South Wales<br>3. Northern Territory<br>4. Queensland<br>5. South Australia<br>6. Tasmania<br>7. Victoria<br>8. Western Australia |
| 8<br><br>Other questions<br>About you | What is the highest level of education you have completed?<br>1. High school year 9 or below<br>2. High school year 10 (or equivalent)<br>3. High school year 11 (or equivalent)<br>4. Completed high school (year 12, form 6 HSC)<br>5. TAFE, or Trade certificate or apprenticeship<br>6. Associate diploma<br>7. Bachelor's degree<br>8. Postgraduate diploma<br>9. Master's degree<br>10. Doctorate<br>11. Other, please specify_____ |
| 8<br><br>Other questions<br>About you | Which of these best describes your current employment status?<br>1. Employed full-time (35+ hours per week)<br>2. Employed part-time (less than 35 hours per week)<br>3. Not employed BUT looking for work |

| | |
|---|---|
| | 4. Neither employed NOR looking for work - Retired<br>5. Neither employed NOR looking for work - Non-working student<br>6. Neither employed NOR looking for work - Home duties<br>7. Neither employed NOR looking for work – Other |
| 8<br><br>Other questions<br><br>About you | Last financial year, which range best describes your **PERSONAL** income before tax or anything else was deducted?<br><br>Please include income from all sources, including wages, investments and government pensions and benefits.<br><br>1. Less than $20,000<br>2. $20,000 to less than $40,000<br>3. $40,000 to less than $60,000<br>4. $60,000 to less than $80,000<br>5. $80,000 to less than $125,000<br>6. $125,000 to less than $150,000<br>7. $150,000 to less than $200,000<br>8. $200,000 or more |
| 8<br>Other questions<br>About you | Do you have a long-standing illness or disability?<br><br>1. Arthritis<br>2. Back pain<br>3. Heart problems<br>4. Asthma or a lung condition<br>5. Cancer<br>6. Diabetes<br>7. Stroke<br>8. Other **[please specify _____]**<br>9. None |
| Other questions<br>About you | |

| | |
|---|---|
| | Apart from depression, select which other mental disorders you are diagnosed with<br><br>1. Anxiety disorder (e.g., Generalised Anxiety Disorder, Social Phobia, Panic Disorder, Agoraphobia, Specific Phobia or other)<br>2. Bipolar disorder (e.g., mania, bipolar I, II)<br>3. PTSD (e.g., post-traumatic distress disorder)<br>4. Schizophrenia or other psychotic disorder (e.g., schizophreniform, schizoaffective disorder)<br>5. OCD (e.g., obsessive compulsive disorder)<br>6. Eating disorder (e.g., anorexia nervosa, bulimia nervosa)<br>7. Personality disorder (e.g., borderline personality disorder)<br>8. Substance abuse disorders (e.g., alcohol abuse/dependent disorder, other substance abuse/dependent disorder)<br>9. Other [please specify _____]<br>10. None |
| 8<br>Comment | Space is provided below for any comments you may have about the survey |
| 8<br>End | This is the end of the survey. Thank you for your participation. We greatly appreciate the time you have taken to answer our questions.<br><br>If you are feeling distressed by this survey, please seek further assistance by contacting your local GP or Beyond Blue at https://www.beyondblue.org.au/about-us/contact-us, calling the Mental health line at 1800 011 511 or Lifeline at 13 11 14 (24 hours a day/ 7 days a week)." If you are in crisis, please present to your emergency department.<br><br>To request a copy of the final study report once completed, please email health.economy@mq.edu.au. The final study report will also be posted to our website: health-economy.mq.edu.au and announced on our twitter: @MUCHE_Macquarie. |

| | |
|---|---|
| 8<br>End | Would you like to enter a draw for a chance to win one of three $200 Woolworths vouchers?<br><br>1. Yes **[redirected to a new link]**<br><br>2. No [end] |
| 8<br>End | Please enter your email address _____ |
| 8<br>End | If you are one of the three winners, we will contact you via email by September 2021 |

# Appendix 2

## 2.1 Chi-square tests for characteristics between DCE 1 and DCE2

| | Gender | | | | |
|---|---|---|---|---|---|
| DCE | 1 | 2 | 3 | Total | |
| 1 | 143 | 327 | 11 | 481 | |
| 2 | 158 | 317 | 1 | 476 | |
| Total | 301 | 644 | 12 | 957 | Pr = 0.010 |

| | Income | | | | |
|---|---|---|---|---|---|
| DCE | 1 | 2 | 3 | Total | |
| 1 | 220 | 239 | 25 | 484 | |
| 2 | 202 | 260 | 14 | 476 | |
| Total | 422 | 499 | 39 | 960 | Pr = 0.096 |

| | Education | | | | |
|---|---|---|---|---|---|
| DCE | 1 | 2 | 3 | Total | |
| 1 | 152 | 157 | 175 | 484 | |
| 2 | 145 | 177 | 154 | 476 | |
| Total | 297 | 334 | 329 | 960 | Pr = 0.268 |

| | Employment | | | | |
|---|---|---|---|---|---|
| DCE | 1 | 2 | 3 | Total | |
| 1 | 191 | 152 | 141 | 484 | |
| 2 | 201 | 175 | 100 | 476 | |
| Total | 392 | 327 | 241 | 960 | Pr = 0.012 |

| | Ethnicity | | | |
|---|---|---|---|---|
| DCE | 1 | 2 | Total | |
| 1 | 392 | 74 | 466 | |
| 2 | 360 | 96 | 456 | |
| Total | 752 | 170 | 922 | Pr = 0.043 |

* Gender 1: Male – Gender 2: Female – Gender 3: Non-binary

* Ethnicity 1: Australian – Ethnicity 2: Non-Australian

* Income 1: Low income – Income 2: Middle income – Income 3: High income

* Education 1: High-school or less – Education 2: Diplomas/ Certificates – Education 3: University Degree

* Employment 1: Full-time - Employment 2: Part-time – Employment 3: Not employed

## 2.2 Association between health literacy & respondents' characteristics- DCE 1 & DCE 2 Multinomial Logit Model

|  | Number of obs = | 466 |
|---|---|---|
|  | LR chi2(20) = | 37.07 |
|  | Prob > chi2 = | 0.0115 |
| LL = -365.98729 | Pseudo R2 = | 0.0482 |

| DCE 1 | | | | |
|---|---|---|---|---|
| Clusters | Coef. | Std. Err. | z | P>z |
| **1** | | | | |
| Gender | | | | |
| Female | 0.081 | 0.271 | 0.300 | 0.766 |
| Non-binary | 0.548 | 0.923 | 0.590 | 0.553 |
| | | | | |
| Age | 0.011 | 0.012 | 0.910 | 0.361 |
| Ethnicity | -0.504 | 0.348 | -1.450 | 0.147 |
| | | | | |
| Education | | | | |
| Diplomas/ certificates | 0.076 | 0.323 | 0.240 | 0.814 |
| University degree | 0.803 ** | 0.323 | 2.480 | 0.013 |
| | | | | |
| Employment | | | | |
| part-time | 0.359 | 0.325 | 1.110 | 0.268 |
| Not employed | 0.524 | 0.363 | 1.450 | 0.148 |
| | | | | |
| Income | | | | |
| Middle income | 0.024 | 0.308 | 0.080 | 0.937 |
| High income | 0.500 | 0.560 | 0.890 | 0.372 |
| | | | | |
| _cons | -2.176 | 0.549 | -3.970 | 0.000 |
| **2** | (base outcome) | | | |
| **3** | | | | |
| Gender | | | | |
| Female | -0.030 | 0.378 | -0.080 | 0.936 |
| Non-binary | 2.528 *** | 0.725 | 3.490 | 0.000 |
| | | | | |
| Age | -0.017 | 0.019 | -0.880 | 0.378 |
| Ethnicity | 0.041 | 0.456 | 0.090 | 0.929 |
| | | | | |
| Education | | | | |
| Diplomas/ certificates | -0.524 | 0.398 | -1.320 | 0.188 |
| University degree | -0.608 | 0.428 | -1.420 | 0.155 |
| | | | | |
| Employment | | | | |
| Part-time | 0.321 | 0.445 | 0.720 | 0.470 |
| Not employed | 0.461 | 0.493 | 0.930 | 0.350 |
| | | | | |
| Income | | | | |
| Middle income | 0.546 | 0.422 | 1.290 | 0.196 |
| High income | 0.603 | 0.912 | 0.660 | 0.508 |
| | | | | |
| _cons | -1.697 | 0.758 | -2.240 | 0.025 |

|  | Number of obs = | 456 |
|---|---|---|
|  | LR chi2(20) = | 22.7 |
|  | Prob > chi2 = | 0.3037 |
| LL = -448.02611 | Pseudo R2 = | 0.0247 |

| DCE 2 | | | | |
|---|---|---|---|---|
| Clusters | Coef. | Std. Err. | z | P>z |
| **1** | | | | |
| Gender | | | | |
| Female | 0.037 | 0.230 | 0.160 | 0.872 |
| Non-binary | 0.144 | 1224.241 | 0.000 | 1.000 |
| | | | | |
| Age | -0.011 | 0.011 | -0.990 | 0.322 |
| Ethnicity | -0.103 | 0.262 | -0.390 | 0.695 |
| | | | | |
| Education | | | | |
| Diplomas/ certificates | -0.157 | 0.268 | -0.590 | 0.557 |
| University degree | 0.167 | 0.282 | 0.590 | 0.553 |
| | | | | |
| Employment | | | | |
| part-time | -0.404 | 0.271 | -1.490 | 0.135 |
| Not employed | -0.617 * | 0.348 | -1.770 | 0.077 |
| | | | | |
| Income | | | | |
| Middle income | -0.127 | 0.268 | -0.470 | 0.636 |
| High income | 0.085 | 0.680 | 0.120 | 0.901 |
| | | | | |
| _cons | 1.096 | 0.501 | 2.190 | 0.029 |
| **2** | (base outcome) | | | |
| **3** | | | | |
| Gender | | | | |
| Female | -0.088 | 0.313 | -0.280 | 0.778 |
| Non-binary | 13.965 | 947.879 | 0.010 | 0.988 |
| | | | | |
| Age | -0.023 | 0.016 | -1.450 | 0.148 |
| Ethnicity | 0.108 | 0.348 | 0.310 | 0.755 |
| | | | | |
| Education | | | | |
| Diplomas/ certificates | 0.145 | 0.349 | 0.420 | 0.678 |
| University degree | -0.309 | 0.409 | -0.760 | 0.450 |
| | | | | |
| Employment | | | | |
| Part-time | -0.488 | 0.389 | -1.260 | 0.209 |
| Not employed | -0.452 | 0.468 | -0.970 | 0.334 |
| | | | | |
| Income | | | | |
| Middle income | -0.651 * | 0.372 | -1.750 | 0.080 |
| High income | -0.365 | 0.951 | -0.380 | 0.701 |
| | | | | |
| _cons | 0.654 | 0.683 | 0.960 | 0.339 |

\* Base Outcome 2: Moderate Health Literacy Cluster

# Appendix 3

## 3.1 Mean differences results – DCE 1

Mixed Logit Model DCE 1

| | | Coefficient | Standard Error | P-value |
|---|---|---|---|---|
| **Side-effects** | Sexual - Weight gain | -0.206 | 0.221 | 0.350 |
| | Sexual - Gastrointestinal | -0.129 | 0.283 | 0.649 |
| | Sexual - Sleep | -0.577 | 0.214 | 0.007 |
| | Sexual - Fatigue | -1.094 | 0.199 | 0.000 |
| | Weight - Gastrointestinal | 0.077 | 0.250 | 0.757 |
| | Weight - Sleep | -0.371 | 0.181 | 0.041 |
| | Weight - Fatigue | -0.888 | 0.180 | 0.000 |
| | Gastrointestinal - Sleep | -0.449 | 0.205 | 0.028 |
| | Gastrointestinal - Fatigue | -0.965 | 0.230 | 0.000 |
| | Sleep - Fatigue | -0.516 | 0.157 | 0.001 |
| **Number of visits** | 10 visits - 16 visits | -0.149 | 0.108 | 0.168 |
| **Waiting time** | 2 weeks - 1 month | -0.002 | 0.129 | 0.984 |
| | 2 weeks - 3 months | 0.620 | 0.141 | 0.000 |
| | 1 month - 3 months | 0.623 | 0.140 | 0.000 |

Health Literacy Sub-Group Analysis – Mixed Logit Models DCE 1

| | | Coefficient | Standard Error | P-value |
|---|---|---|---|---|
| **EffectiveX Clusters** | Effective * Cluster1 - Effective * Cluster2 | 0.025 | 0.179 | 0.885 |
| | Effective * Cluster2 - Effective * Cluster3 | -0.340 | 0.154 | 0.028 |
| | Effective * Cluster 1 - Effective * Cluster3 | -0.314 | 0.199 | 0.114 |
| **WaitingXClusters** | 2 weeks * Cluster 1 - 2 weeks * Cluster 2 | -0.409 | 0.219 | 0.063 |
| | 1 month * Cluster 1 - 1 month * Cluster 2 | -0.206 | 0.218 | 0.344 |
| | 3 months * Cluster 1 - 3 months * Cluster 2 | 0.144 | 0.280 | 0.605 |
| | 2 weeks * Cluster 2 - 2 weeks * Cluster 3 | -0.114 | 0.272 | 0.674 |
| | 2 weeks * Cluster 1 - 2 weeks * Cluster 3 | -0.523 | 0.322 | 0.104 |

Gender Sub-Group Analysis – Mixed Logit Models DCE 1

| | | Coefficient | Standard Error | P-value |
|---|---|---|---|---|
| **Side-effectXGender** | Sexual * Male - Sexual * Female | 0.629 | 0.354 | 0.076 |
| | Weight * Male - Weight * Female | 0.966 | 0.308 | 0.002 |
| | Gastrointestinal * Male - Gastrointestinal * Female | 0.867 | 0.281 | 0.002 |
| | Gastrointestinal * Female - Gastrointestinal * Non-binary | 0.221 | 0.997 | 0.824 |
| | Gastrointestinal * Male - Gastrointestinal * Non-binary | 1.089 | 1.011 | 0.281 |
| | Sleep * Male - Sleep * Female | 0.47 | 0.241 | 0.052 |
| | Fatigue * Male - Fatigue * Female | -0.110 | 0.237 | 0.642 |
| **CostXGender** | Cost * Male - Cost * Female | 0.471 | 0.264 | 0.075 |

## 3.2 Mean differences results – DCE 2

Mixed Logit Model DCE 2

| | | Coefficient | Standard Error | P-value |
|---|---|---|---|---|
| **Side-effects** | Sexual - Weight gain | -1.043 | 0.206 | 0.000 |
| | Sexual - Gastrointestinal | -0.062 | 0.225 | 0.783 |
| | Sexual - Sleep | -1.667 | 0.188 | 0.000 |
| | Sexual - Fatigue | -2.114 | 0.197 | 0.000 |
| | Weight - Gastrointestinal | 0.981 | 0.203 | 0.000 |
| | Weight - Sleep | -0.633 | 0.157 | 0.000 |
| | Weight - Fatigue | -1.071 | 0.152 | 0.000 |
| | Gastrointestinal - Sleep | -1.615 | 0.185 | 0.000 |
| | Gastrointestinal - Fatigue | -2.052 | 0.196 | 0.000 |
| | Sleep - Fatigue | -0.437 | 0.124 | 0.000 |
| **Number of visits** | 10 visits - 16 visits | 0.105 | 0.116 | 0.366 |
| | 4 visits - 16 visits | -0.198 | 0.106 | 0.061 |
| **Waiting time** | 2 weeks - 1 month | -0.261 | 0.135 | 0.054 |
| | 2 weeks - 3 months | 0.669 | 0.123 | 0.000 |
| | 1 month - 3 months | 0.930 | 0.126 | 0.000 |

Health Literacy Sub-Group Analysis – Mixed Logit Models DCE 2

| | | Coefficient | Standard Error | P-value |
|---|---|---|---|---|
| **EffectiveX Clusters** | Effective * Cluster1 - Effective * Cluster2 | 0.874 | 0.219 | 0.000 |
| | Effective * Cluster2 - Effective * Cluster3 | -0.436 | 0.235 | 0.064 |
| | Effective * Cluster 1 - Effective * Cluster3 | 0.437 | 0.133 | 0.001 |
| **WaitingXClusters** | 2 weeks * Cluster 1 - 2 weeks * Cluster 2 | 0.41 | 0.217 | 0.059 |
| | 1 month * Cluster 1 - 1 month * Cluster 2 | 0.230 | 0.252 | 0.362 |
| | 3 months * Cluster 1 - 3 months * Cluster 2 | 0.161 | 0.218 | 0.459 |
| | 2 weeks * Cluster 2 - 2 weeks * Cluster 3 | -0.300 | 0.226 | 0.185 |
| | 2 weeks * Cluster 1 - 2 weeks * Cluster 3 | 0.109 | 0.171 | 0.522 |
| **TreatmentXClusters** | Psychotherapy * Cluster 1 - Combination * Cluster 1 | -0.124 | 0.178 | 0.486 |

Gender Sub-Group Analysis – Mixed Logit Models DCE 2

|  |  | Coefficient | Standard | P-value |
|---|---|---|---|---|
| **Side-effectXGender** | Sexual * Male - Sexual * Female | -0.206 | 0.365 | 0.572 |
|  | Weight * Male - Weight * Female | 0.031 | 0.262 | 0.903 |
|  | Gastrointestinal * Male - Gastrointestinal * Female | 0.234 | 0.326 | 0.472 |
|  | Gastrointestinal * Female - Gastrointestinal * Non-binary | -3.009 | 2.189 | 0.169 |
|  | Gastrointestinal * Male - Gastrointestinal * Non-binary | -2.775 | 2.197 | 0.207 |
|  | Sleep * Male - Sleep * Female | -0.129 | 0.199 | 0.515 |
|  | Fatigue * Male - Fatigue * Female | -0.394 | 0.186 | 0.035 |
| **CostXGender** | Cost * Male - Cost * Female | -0.176 | 0.151 | 0.246 |

# Appendix 4 – Rapid Review Search Key Word

| DCEs | Mental Health | Treatment | Health Literacy |
|---|---|---|---|
| Discrete Choice Experiment(s)<br><br>Discrete Choice model(l)ing<br><br>Discrete choice conjoint experiment<br><br>Stated preference<br><br>Paired comparisons<br><br>Pairwise choices<br><br>Conjoint analysis<br><br>Conjoint measurement<br><br>Conjoint studies<br><br>Conjoint choice experiment<br><br>Conjoint choice experiments | Mental health<br><br>Mental illness<br><br>Mental ill health<br><br>Depression<br><br>Clinical depression<br><br>Depressive disorder<br><br>Major depressive disorder<br><br>Major depression<br><br>Depressive episode | Treatment preferences<br><br>Anti-depressants<br><br>Anti-depressant medications<br><br>Pharmacotherapy<br><br>Selective serotonin reuptake inhibitors (SSRIs)<br><br>Psychotherapy<br><br>Therapy<br><br>Psychological treatment<br><br>Counselling<br><br>Depression treatment<br><br>Cognitive Behavioral Therapy (CBT) | Health literacy<br><br>Mental health literacy<br><br>Multi-dimensional health literacy<br><br>Health literacy dimensions |

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