Socioeconomic factors and parents' preferences for internet- and mobile-based parenting interventions to prevent youth mental health problems: A discrete choice experiment

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A B S T R A C T

Background: The positive impact of parenting programs for youth mental health is undermined by difficulties engaging parents. Low engagement disproportionately impacts parents of lower-socioeconomic positions (SEPs). Internet- and mobile-based interventions hold potential for overcoming barriers to enrolment, but additional research is needed to understand how programs can appropriately meet the needs of parents across SEPs. Consumer preference methods such as discrete choice experiments may be valuable in this endeavour.
Method: A discrete choice experiment was used to determine the relative influence of modifiable program features on parents' intent to enrol. 329 Australian parents of children aged 0–18 repeatedly selected their preferred program from randomized sets of hypothetical programs in an online survey. Each hypothetical program was unique, varying across four program features: module duration, program platform, user control, and program cost. Cumulative link models were used to predict choices, with education, household income, and community advantage used as indicators of SEP.
Results: Overall, parents preferred cheaper programs and briefer modules. Parents' preferences differed based on their socioeconomic challenges. Lower-income parents preferred briefer modules, cheaper programs and application-based programs compared to higher-income parents. Parents with less education preferred briefer modules and a predefined module order. Parents living in areas of less advantage preferred website-based programs, user choice of module order, and more expensive programs.
Conclusions: This study offers program developers evidence-based strategies for tailoring internet- and mobile-based parenting interventions to increase lower-SEP parent enrolment. Findings also highlight the importance of considering parents' socioeconomic challenges to ensure programs do not perpetuate existing mental health inequalities, as "one-size-fits-all" approaches are likely insufficient for reaching lower-SEP parents.

Parenting programs can be defined as any intervention delivered to a parent to increase parental knowledge, skills, and confidence, with the aim of reducing the prevalence of mental health problems in children and adolescents (Sanders et al., 2008). Despite meta-analyses (Johnson et al., 2018; Furlong et al., 2012; Kaminski et al., 2008; Yap et al., 2016) indicating parenting programs can significantly reduce child mental health symptoms ($d = 0.12$–0.59), the positive impact of these programs is undermined by difficulties engaging parents (Finan et al., 2018; Hansen et al., 2019). Studies indicate that only 10% to 31% of eligible

parents enrol to participate in face-to-face parenting programs (Garvey et al., 2006; Heinrichs et al., 2005; Thornton and Calam, 2011).

Families experiencing greater socioeconomic challenges are likely to find particular benefit in parenting programs aimed at the prevention of youth mental health problems, due to the increased risk of mental health problems among young people in lower-socioeconomic position (SEP) families (Lawrence et al., 2016; Reiss et al., 2019). SEP is defined as the relative positions an individual or family hold within a social structure based on their access to limited and valued resources (Krieger et al.,

1997; Lynch and Kaplan, 2000). SEP is understood to be an aggregate concept, which includes both resource-based and prestige-based conditions (Krieger et al., 1997). Consequently, a wide array of measures have been used in health-related literature to capture this multi-dimensional construct. Common indicators of SEP include measures at an individual level (e.g. education; Richardson et al., 2010) and household level (e.g. household income; Zimmerman, 2005), or contextual measures at a community level (e.g. neighbourhood disadvantage; Farahmand et al., 2011).

Despite the benefit of these programs for lower-SEP families, parents of lower-SEPs are less engaged in face-to-face parenting programs for youth mental health, compared to higher-SEP parents (Chacko et al., 2016; Lundahl et al., 2006; Reyno and McGrath, 2006). Engagement is often conceptualised across initial engagement (e.g. intent to enrol and enrolment) and ongoing engagement (e.g. retention; Finan et al., 2018), with lower-SEP parents less engaged across both stages of engagement. Significant associations between SEP and retention have been found in two comprehensive reviews of RCTs of face-to-face parenting programs aimed at the prevention of youth mental health problems (Chacko et al., 2016; Reyno and McGrath, 2006). These reviews found that parents with less education and less income were significantly more likely to drop out of these face-to-face parenting programs, compared to higher-SEP parents. One review (Finan et al., 2018) found no consistent association between SEP and engagement, however it was suggested this finding may have been impacted by the range of predictors used across studies. Of particular interest in the present study, SEP has also been found to impact initial engagement. A significant moderate effect of SEP on enrolment was found in a community based parenting intervention (Eisner and Meidert, 2011), with only 30.5% of parents with lower-SEP enrolling in the program, compared to 53.1% of those above-median SEP.

The internet has been identified as an alternative means of intervention delivery that may increase the reach of parenting programs among lower-SEP populations. Meta-analyses indicate parenting internet- and mobile-based interventions (IMIs) can successfully reduce externalizing and internalizing difficulties in young people (Nieuwboer et al., 2013; Spencer et al., 2020), with no significant difference in intervention effects found between online and face-to-face parenting programs (Florean et al., 2020). Examples of preventive parenting IMIs targeting youth mental health include Cool Little Kids Online (Morgan et al., 2016; Morgan et al., 2017), *ez*Parent (Breitenstein et al., 2016; Breitenstein et al., 2019), Triple P Online (Baker et al., 2017; Sanders, 1999; Sanders et al., 2003), Parenting Resilient Kids (Fernando et al., 2018; Sim et al., 2020), ParentWorks (Piotrowska et al., 2020), and Partners in Parenting (Cardamone-Breen et al., 2018; Yap et al., 2018; Yap et al., 2019).

Research indicates lower-SEP parents benefit from preventive parenting IMIs (Harris et al., 2020; Nieuwboer et al., 2013), and find them highly satisfactory (Baggett et al., 2010), yet remained underserved by these programs (Cardamone-Breen et al., 2018; Fossum et al., 2018; Morgan et al., 2017). Preference data suggests parents of lower-SEPs favour media-based parenting information (Metzler et al., 2012), with the affordability, convenience, and self-directed nature of IMIs highly appealing to this population (Baggett et al., 2010; Fleming et al., 2015). However, they also experience unique barriers to initial engagement, with more limited access to internet-enabled devices (Willis and Tranter, 2006) and lower digital literacy (Rothbaum et al., 2008). Currently there are no meta-analyses available investigating lower-SEP parents' enrolment in IMIs aimed at the prevention of youth mental health difficulties, however trials indicate that lower-SEP parents face greater barriers to engaging in these digital programs, with lower enrolment rates than their higher-SEP peers. For example, an evaluation of the Strongest Families Smart Website intervention found that nonparticipation was significantly associated with less parental education after controlling for other parental factors (Fossum et al., 2018). This is consistent with many evaluations of preventive parenting

IMIs noting difficulties enrolling parents with varying socioeconomic challenges (e.g. Fleming et al., 2021; Morgan et al., 2016; Yap et al., 2017). Additionally, a systematic literature review of engagement enhancement strategies for underserved parent populations in technology-assisted parenting programs found minimal effective and practical strategies available for addressing the under-engagement of lower-SEP parents in parenting IMIs for youth mental health (Hansen et al., 2019).

One challenge in ensuring preventive parenting IMIs reach parents across the socioeconomic spectrum is a lack of understanding regarding how different socioeconomic factors impact parent enrolment. Despite lower-SEP parents often being treated as a homogenous group within the literature (Mendez et al., 2009), research indicates that parents' program preferences likely vary based on the specific social and economic challenges they face (Broomfield et al., 2021). These differences are not well understood as lower-SEP families are underrepresented in most samples used to develop and evaluate parenting programs for youth mental health (McGoron and Ondersma, 2015). Therefore, to adequately reach parents across the socioeconomic spectrum, additional research is needed to understand the ways in which lower-SEP and higher-SEP parents' preferences differ and how this may be impacted by parents' sociodemographic characteristics (Hansen et al., 2019).

Discrete Choice Experiments (DCEs) have been suggested as a particularly powerful method for eliciting preferences and exploring the relative importance of program features for different parent populations (Chacko et al., 2016; Hansen et al., 2019). This approach has been used to collect stated preference data (i.e. what someone says they will do) in the absence of revealed preference data (i.e. what someone actually does) to model the treatment preferences of parents with children experiencing mental health problems (Cunningham et al., 2013; Cunningham et al., 2008; Fegert et al., 2011). DCEs require participants to make a series of choices between two or more hypothetical scenarios, goods, or services (Lancsar and Louviere, 2008; Louviere et al., 2000). They have been shown to be associated with actual behavior (Caruso et al., 2009), mimic real-world decision-making (Ryan and Gerard, 2003) and reduce social desirability biases (Phillips et al., 2002). DCEs may be particularly useful in obtaining preference data from "difficult-to-reach" populations, such as lower-SEP parents, due to their ability to obtain parents' preferences without requiring prior contact with a service or program (Chacko et al., 2016; Hansen et al., 2019). However, no study to date has used a DCE design to explore lower-SEP parents' preferences for preventive parenting IMIs for youth mental health.

1. The present study

Due to the lack of evidence-based, practical strategies found to be effective in engaging lower-SEP parents in preventive parenting IMIs for youth mental health (Hansen et al., 2019), the present study sought to use a DCE to determine the relative influence of modifiable program features on parents' intent to enrol in preventive parenting IMIs and investigate how preferences vary across the socioeconomic spectrum. The design of the present DCE was informed by a preliminary qualitative investigation of lower-SEP parents' preferences for preventive parenting IMIs (Broomfield et al., 2021). The qualitative study used thematic analysis of interview transcripts to identify 23 modifiable program features important to lower-SEP parents' engagement. Therefore, the present study extends upon Broomfield et al.'s (2021) findings by investigating the relative importance of four of the most salient and plausible program features: 1) module duration; 2) program platform; 3) user control of module order; and 4) program cost. This DCE will offer program developers aiming to increase the uptake of their preventive parenting IMIs with generalisable findings regarding program features most likely to increase the enrolment of parents across the socioeconomic spectrum.

Research evidence also suggests that parents' preferences for features may vary based on parents' specific socioeconomic experiences

(Broomfield et al., 2021; Lakind and Atkins, 2018; Mendez et al., 2009). Therefore, the present study will include participants across the socioeconomic spectrum and utilise several measures of socioeconomic advantage to explore how parents' program preferences differ based on the amount and type of advantage or disadvantage they experience. In line with social inequality literature, both resource-based (household income) and prestige-based (education) measures of SEP will be used, as well as a contextual measure (community disadvantage), which is often used in health literature to investigate how access to local services and resources can impact service use (Shavers, 2007). Such an exploration of the way different socioeconomic factors influence parents' program preferences may facilitate the tailoring of programs to optimise enrolment across socioeconomic conditions.

It is hypothesised that all four program attributes will significantly predict parents' choice of program, with parents preferring briefer modules, application-based programs, greater user control of module order, and cheaper programs. Based on findings from Broomfield et al. (2021) as well as previous literature highlighting barriers present for parents experiencing different types of social and economic challenges (Mendez et al., 2009; Rothbaum et al., 2008; Willis and Tranter, 2006), it is hypothesised that parents' preferences for program features will differ for higher- and lower-SEP parents, however the relationship between program features and SEP will also vary based on SEP indices. In particular, it is predicted that parents' preference for program cost will significantly differ based on household income, with lower-income parents having a stronger preference for cheaper programs. It is also predicted that parents' preference for module duration will significantly differ based on their level of education, with parents with less education having a stronger preference for briefer modules. Parents' preference for program platform will significantly differ based on community advantage, with parents living in lower-advantage areas having a stronger preference for application-based programs.

2. Methods

2.1. Development of discrete choice experiment

The design of the DCE was informed by a review of the literature (Hansen et al., 2019) and 16 semi-structured interviews with Australian parents of children aged 0 to 18 years (Broomfield et al., 2021). Through thematic analysis of interview transcripts, 23 modifiable program features were identified as important to program choice for lower-SEP parents. A framework established by Helter and Boehler (2016) through the systematic review of attribute development methods used in 86 health-related DCEs was employed to reduce these 23 modifiable program features to an appropriate and feasible design. The framework provided seven criteria for attribute selection: saliency, plausibility, capability of being traded, completeness, far from latent construct, non-dominance, and manipulability. Consultations with two experts, a parenting and youth mental health researcher and a preventive parenting IMI developer, guided the appropriate application of the selection criteria, with discussions leading to the exclusion of 19 program features. This resulted in four program features, also known as attributes, being selected to be used in the present DCE. Table 1 indicates the four attributes used in this study. This table also presents each attribute's possible options, referred to as levels. Each hypothetical program presented in the DCE survey is called a choice option and includes one level from each of the four attributes. Two choice options are presented next to each other and participants have to select their preferred choice option. An example of a choice set of two choice options is shown in Fig. 1. After selecting and drafting the initial version of the survey, further consultation occurred with experts to simplify the language used throughout the DCE, with this resulting in refinement to the wording of the attribute levels and additional information in the introductory material presented to participants to explain the task (see Supplementary Fig. S1). Four parents were then invited to pilot the survey, providing written feedback on the content and format of the survey.

The final version of the survey was programmed and administered by Qualtrics (Qualtrics, 2020). The DCE survey required participants to choose between pairs of hypothetical parenting programs for youth mental health. An example of one possible choice set is shown in Fig. 1. The combinations of attribute levels shown across the choice sets were designed experimentally, so statistical methods could be used to determine parents' relative preferences for changes in attribute levels based on their choices. A binary discrete choice design was chosen, rather than a multinomial design, allowing for clearer application and interpretation (Lancsar and Louviere, 2008). Additionally, a full factorial design was utilised in this study, whereby all possible combinations of attributes and their levels are included in the experimental design, resulting in 630 choice sets. This allowed for the estimation of both main effects and interaction effects (Lancsar and Louviere, 2008), without the additional assumptions required of efficient experimental designs (Johnson et al., 2013). No "opt-out" option was provided in this design and the left/right presentation of programs was randomized. Due to the time and cognitive load required of participants to complete DCE surveys, each participant received a random selection of 25 of the possible 630 choice sets, with this number deemed acceptable during piloting.

2.2. Recruitment

Australian parents or guardians of children aged 0 to 18 years were recruited between March 2020 and March 2021 through digital advertisements posted in parenting and community social media pages or alternatively disseminated through one of two survey panel platforms, Qualtrics Panels or Prolific Academic (see Fig. 2). Inclusion criteria were: 1) live in Australia; 2) aged 18 years or older; 3) parent or guardian of a child aged 0 to 18 years; and 4) able to read and understand English. A purposive sampling approach was used whereby parents from lower-SEP areas and with lower-household incomes received a greater proportion of digital advertising materials through targeted Facebook advertising campaigns and were targeted during Prolific Academic and Qualtrics Panels recruitment to facilitate adequate representation of these parents. Prolific Academic and Qualtrics Survey Panel were chosen to support recruitment due to evidence supporting the validity of data obtained from these platforms (Goodman and Paolacci, 2017; Peer et al., 2017). Thorough data cleaning processes were also used to further support the quality of the data, which included replacing responses that failed quality checks such as non-differentiation in choices, duplications, response times less than half the median, and suspicious open-text responses.

The exploratory nature of the present study meant initial parameter values required for minimum sample size requirements (de Bekker-Grob et al., 2015) were uncertain prior to data collection. To plan sampling requirements, expected parameter values were therefore determined by modeling data obtained from the first 30 participants. This revealed that with an α error probability of 0.05, a minimum of 3601 observations, or $n = 144$ as each participant received 25 choice sets, was required to

Table 1

Attributes and Levels Included in the DCE Design.

Attribute name	Attribute description	Attribute levels
Module duration	How long it takes to complete each session or module.	15 min 25 min 45 min
Program platform	The platform through which you access the program.	Website Downloadable application
User control of module order	The user's ability to select the order in which they complete the modules.	Predefined order User's choice of order
Program cost	The amount which has to be paid to access the program.	AU$20 AU$30 AU$50

Program		Program	
Typical session length:	25 minutes	Typical session length:	45 minutes
Accessed via:	A downloadable application (app)	Accessed via:	An online website
Program flexibility:	Sessions have to be completed in a specific order	Program flexibility:	You can choose the order in which you complete the sessions
Total cost of all sessions:	$50	Total cost of all sessions:	$30

Fig. 1. An example choice set.

Note. Two possible choice options are presented, with each comprising of four attributes: 1) module duration; 2) program platform; 3) user control of module order; and 4) program cost. The level for each attribute varies across the choice options. For each choice set the participant must select which program they prefer out of the two options, with this repeated by each participant 25 times.
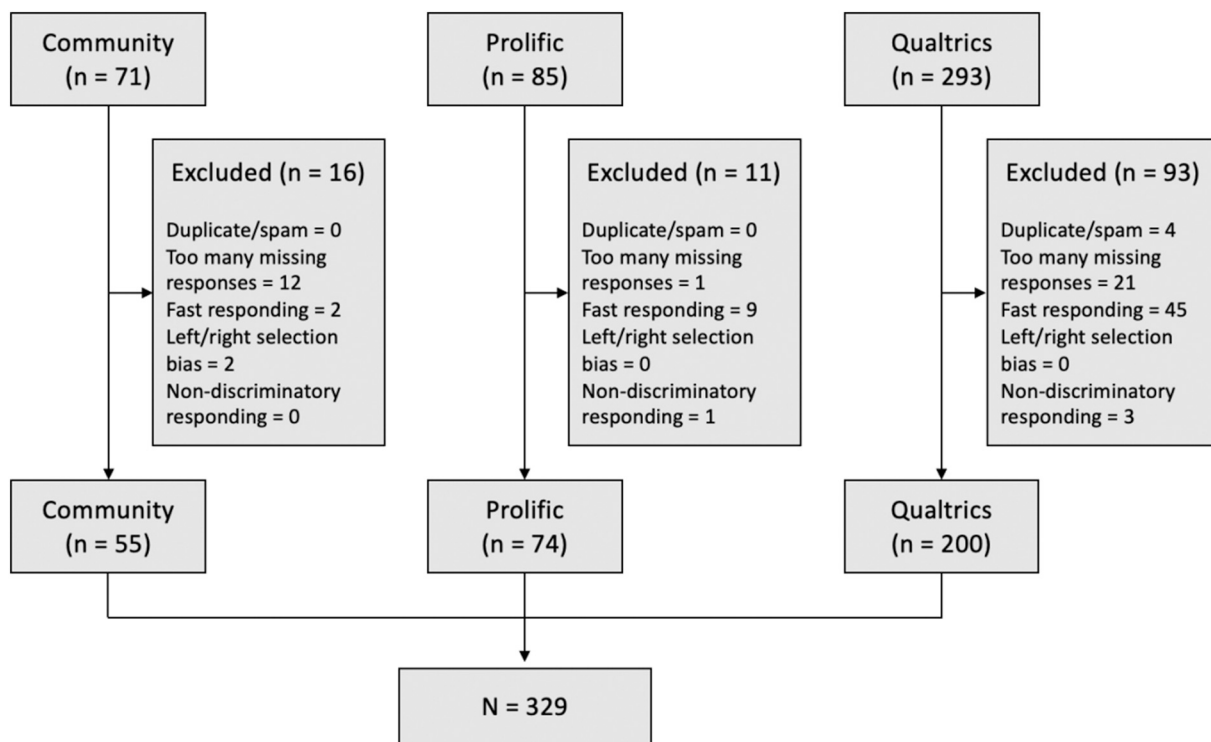

Fig. 2. Flowchart of participants recruited through the three recruitment avenues.

obtain statistical power at 0.80 level (Cohen, 1992) for main effects analyses.

2.3. Participants

329 participants completed the DCE. The mean age of the sample was 39 years (SD = 8.77), 67.8% were female and 31.6% were male. Most participants were married or in a de facto partnership (77.5%) and were employed in either full-time (44.4%) or part-time (22.5%) work. Approximately half the sample (54.4%) were living in a household with an annual taxable income of less than $80,000. Most parents (53.8%) and children (71.4%) had not experienced a mental health difficulty, and 16.5% of the sample had previously participated in a parenting program for youth mental health. Additional sociodemographic characteristics are shown in Table 2.

2.4. Procedure

Digital advertisements were posted on social media sites and survey panel platforms, which included key study information as well as an URL which took participants to the online survey hosted on Qualtrics. Interested parents were asked to read additional participant information prior to consenting to participate. Parents were then screened for eligibility using four pre-survey questions to ensure they met the four inclusion criteria. If eligible, they continued to a series of questions which asked about their sociodemographic features and previous participation in parenting programs. Participants then proceeded to the DCE component of the survey. They were presented with a choice vignette, which explained the task and then a random selection of 25 choice sets. For each choice set participants were asked to choose their preferred program out of two possible program options. The average completion time for participants was 11.85 min. At the conclusion of the

Table 2
Sociodemographic Characteristics of Participants ($N = 329$).

Variables	Participant characteristics
Parent age in years; Mean (SD)	39 (8.77)
Parent gender; *n* (%)	
Female	223 (67.8)
Male	104 (31.6)
Non-binary	2 (0.6)
Born in Australia; *n* (%)[a]	
Yes	253 (76.9)
No	75 (22.8)
Relationship status; *n* (%)	
Married or de facto partnership	255 (77.5)
Separated or divorced	37 (11.2)
Single	33 (10.0)
Widowed	4 (1.2)
Employment status; *n* (%)	
Full-time employment	146 (44.4)
Part-time employment	74 (22.5)
Home duties	69 (21.0)
Casual or freelance work	25 (7.6)
Unemployed	15 (4.6)
Highest education qualification; *n* (%)	
Senior Secondary Certificate of Education or below	59 (17.9)
Postsecondary vocational training	107 (32.5)
Undergraduate or graduate degree	122 (37.1)
Postgraduate degree	41 (12.5)
Annual taxable household income (AU$); *n* (%)	
<$40,000	56 (17.0)
$40,000–$79,999	123 (37.4)
$80,000–$119,999	67 (20.4)
$120,000–$159,999	40 (12.2)
≥$160,000	43 (13.1)
Postcode rurality; *n* (%)[a,b]	
Major Cities	252 (77.3)
Inner Regional	49 (15.0)
Outer Regional	24 (7.4)
Remote	1 (0.3)
Community disadvantage; *n* (%)[a,c]	
High	83 (25.5)
Moderate	140 (43.1)
Low	102 (31.4)
Parent mental health difficulties; *n* (%)	
Yes	152 (46.2)
No	177 (53.8)
Child mental health difficulties; *n* (%)	
Yes	94 (28.6)
No	235 (71.4)
Prior use of parenting program for youth mental health; *n* (%)[a]	
Yes	54 (16.5)
Face-to-face	38 (11.5)
Internet- or mobile-based intervention	16 (4.9)
No	274 (83.5)
Willingness to engage in a future internet- or mobile-based parenting program; *n* (%)[a]	
Yes	263 (79.9)
No	64 (19.6)

[a] Not all frequencies add up to 329 due to missing participant responses.
[b] Classified according to the Australian Statistical Geography Standard Remoteness Structure (Australian Bureau of Statistics, 2018).
[c] Classified according to SEIFA IRSD: high (1–3); moderate (4–7); and low (8–10; Australian Bureau of Statistics, 2016).

survey parents were reimbursed for their time, with reimbursement differing across recruitment streams. Participants recruited through Prolific Academic (18.9%) were reimbursed at the recommended rate of AU$14.42 per hour, Qualtrics participants' (65.3%) reimbursement varied between AU$3.72 and AU$7.50, and those recruited through community (18.9%) were offered entry into a raffle for one of four AU$100 grocery vouchers. Participants did not participate in any further research activities.

2.4.1. Outcome measures

2.4.1.1. Discrete choice experiment.
The DCE consists of four attributes, with two or three levels for each attribute as detailed in Table 1. The DCE was presented to parents through an online survey. They were first provided a brief description of the task, with key terms explained, and a short vignette. This was followed by 25 choice sets, randomly selected from the 630 available choice sets. Parents were asked to repeatedly select their preferred program.

2.4.1.2. Sociodemographic questions.
Participants self-reported age, gender, number of children, age of children, postcode, education, employment status, relationship status, country of birth, and annual household income. They also self-reported whether they or their child had ever been diagnosed with a mental health difficulty, whether they had ever used a face-to-face or internet-based parenting program, and whether they would consider using an internet-based parenting program in the future. Three indices of SEP were used in the main analyses. *Household income* was measured based on parents' self-reported combined annual taxable household income across 10 levels. *Community advantage* was measured using the Socio-Economic Indexes for Areas (SEIFA) Index of Relative Socio-Economic Disadvantage (IRSD; Australian Bureau of Statistics, 2016), which provided 10 levels of community disadvantage based on parents' postcodes. *Parent education* was measured using parents' self-reported highest level of education.

2.4.2. Ethics approval
Monash University's Human Research Ethics Committee (Project ID 23122) granted full ethics approval for this study (03/03/2020).

2.4.3. Statistical analysis
Data were analysed in R version 3.5.3 (R Core Team, 2020) using packages tidyverse_1.3.0 and ordinal_2019.12–10. Initial analyses included summary statistics of sociodemographic variables and frequency tables for choices. Inferences regarding the influence of different program features on program choice were examined using a type of logistic regression known as cumulative link models (CLM), to predict choices. The dependent variable was binary, with 1 and 2 representing whether the participant chose option 1 or 2. Independent variables were the attribute levels listed in Table 1. Two attributes, module length and program cost were continuous. Two attributes, program platform and user control, were dummy coded with the reference levels of 'application-based' and 'user choice of module order', respectively. Symmetric utility models were used, whereby the difference between attribute levels for option 1 and option 2 were used as predictors. Due to the number of tests, a type I error rate of alpha $= 0.002$, rather than 0.05 was adopted throughout, which resulted in a family wise error rate of 6%. A probit link function was used, corresponding to Gaussian assumption for a random utility model of preferences. The relative influence of different attributes on choice was quantified by the standard coefficient estimates in these models.

A full model with all two-, three- and four-way interactions was reviewed (Supplementary Table S1), however given the complexity of the full model with four main effects and eleven interaction effects, a restricted model was examined which allowed for higher statistical efficiency (Supplementary Table S2). Supporting our choice, the Akaike information criterion (AIC) for this restricted model was marginally better than the AIC for the full model. The coefficients from the CLM were reviewed, with the preference weights indicating the effect that each attribute level had on program choice relative to the reference level. To investigate how different SEP variables influenced participants' preferences, interaction terms were then added to this model using three indices of SEP. *Household income* and *community advantage* were treated as a continuous variables. *Parent education* was treated as an ordered factor with four levels. Levels were ordered based on the Australian

Qualifications Framework (Australian Qualifications Framework Advisory Board, 2007) and were: 1) senior secondary certificate of education or below; 2) postsecondary vocational training; 3) undergraduate or graduate degree; and 4) postgraduate degree. The second level was used as the reference level to support clarity in visualisation and interpretation. To ensure there were no substantial differences in preferences across the samples drawn from different recruitment sources, exploratory analyses were conducted to investigate the relationship between recruitment source and program choice. No significant interactions were found and therefore this variable was not included in the main analyses (Supplementary Table S3).

3. Results

The following results sections will outline: 1) parents' overall preferences for program features; and 2) interactions between program features and indices of SEP, including household income, community advantage and parent education, in predicting parents' preferences for program features.

3.1. The influence of program features on parents' preferences

The CLM model found that two of the four attributes significantly predicted parents' program choice. Choices were most strongly influenced by program cost ($z = -11.79$, $p < .001$), followed by module duration ($z = -3.44$, $p < .001$). User control ($z = -0.67$, $p = .502$) and program platform ($z = 0.28$, $p = .777$) did not significantly predict program choice. As shown in Fig. 3, preferences for the two significant attributes were in the expected direction. The statistically-significant negative preference weights for module duration and program cost indicate that parents preferred programs that were cheaper and had briefer modules. The positive preference weight for program platform, indicates a weak, non-significant preference for a website-based program, and the negative preference weight for user control indicates a weak, non-significant preference for user choice of module order.

3.2. Lower-SEP parents' preferences for program features across SEP indices

Interaction effects between attributes and SEP indices in predicting parents' preferences for program features were assessed by inclusion of interactions between the main effects and the SEP indices, with associated tests of the statistical reliability of the covariates' coefficients. Parameter estimates for interaction effects between program features and SEP variables are reported below, with additional details provided in Supplementary Table S5.

The CLM model found household income did not have a significant main effect on program choice ($z = -1.82$, $p = .069$), however it had a significant interaction with three of the four main effects: program platform ($z = 4.98$, $p < .001$), program cost ($z = 4.21$, $p < .001$), and module duration ($z = 3.13$, $p = .002$). The interaction between user control and household income was non-significant ($z = -2.63$, $p = .009$). As income decreased, preference for an application-based program, lower program cost, and briefer modules increased.

Community advantage had a significant main effect on program choice ($z = 3.22$, $p = .001$) and also had a significant interaction with three of the program attributes: user control ($z = 5.64$, $p < .001$), program cost ($z = -3.72$, $p < .001$), and program platform ($z = -3.27$, $p = .001$). The interaction between module duration and community advantage was non-significant ($z = -1.24$, $p = .214$). As community advantage decreased, preference for user choice of module order, higher program cost, and a website-based program increased.

Parent education levels did not have a significant main effect on program choice ($p = .243–0.556$). Two of the four attributes had a significant interaction. As parents' education increased from no postsecondary education to vocational training there was a significant interaction with both module duration ($z = 3.67$, $p < .001$) and user control ($z = -3.38$, $p = .001$). Parents with no formal postsecondary education preferred briefer modules and predefined module order. No other interactions between education and program features were significant.
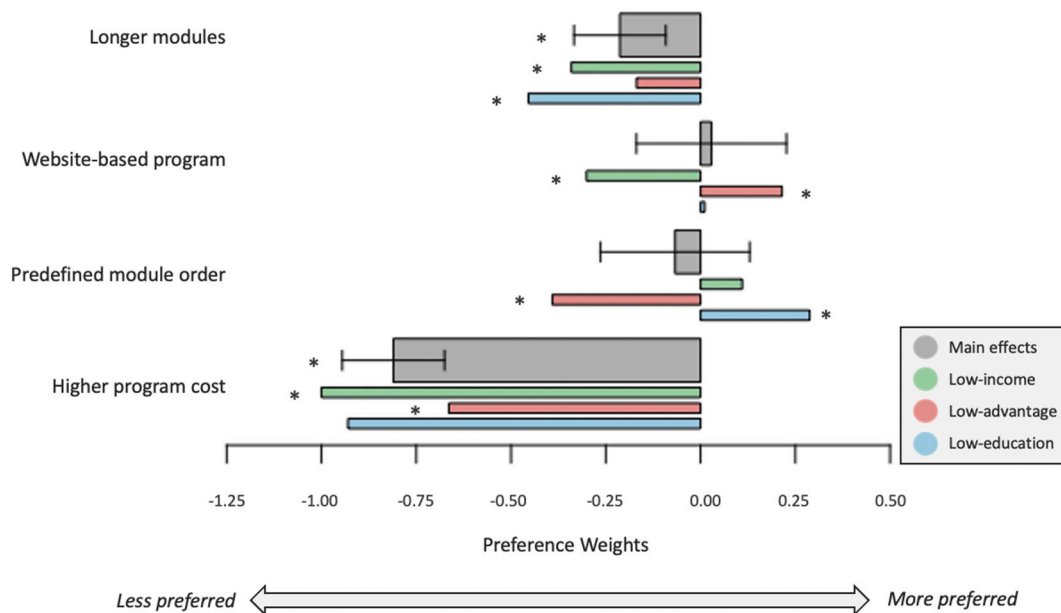

Fig. 3. Preference weights for the main effects and the interaction effects from the CLM
Note. The lowest level for each SEP variable was used to illustrate the interactions between program features and SEP. Therefore, low-income refers to those with a household income of AU$20,000 or less, low-advantage refers to those living in a postcode with an IRSD rating of 1 indicating high community disadvantage, and low-education refers to those with no postsecondary education. Negative scores indicate lower preference for the level listed in the figure, whereas positive scores indicate greater preference for the level listed. *$p < .002$.

4. Discussion

This study is the first to use a DCE to explore lower-SEP parents' preferences for a preventive parenting IMI aimed at the prevention of youth mental health difficulties. To increase the reach of preventive parenting IMIs for youth mental health, we sought to determine the relative influence of four modifiable program features on parents' intent to enrol in a preventive parenting IMI and investigate how different socioeconomic factors influence parents' program preferences. Unexpectedly, only two of the four program features significantly predicted parents' choice of program, with parents preferring cheaper programs and briefer modules, with this consistent for higher- and lower-SEP parents. Predicted interactions between SEP and program features were significant, with lower-income parents preferring cheaper programs and parents with no formal postsecondary education preferring briefer programs. Whilst the interaction between community advantage and program platform was significant, this interaction was not in the anticipated direction. The main findings and their contribution to the literature are discussed further below.

Of the four available program features, the two associated with affordability and convenience were most strongly preferred across the sample. This is consistent with several studies indicating that two primary barriers to parental engagement in parenting programs are financial concerns and competing demands (Duppong-Hurley et al., 2016; Morawska et al., 2011; Rostad et al., 2018). Qualitative research has suggested that practical factors such as these are more readily identified by parents as barriers to their engagement in parenting programs, compared to psychological barriers such as stigma, help-seeking beliefs, and subjective norms (Duppong-Hurley et al., 2016).

As predicted, the preference for affordable and convenient programs was even stronger among lower-income parents. Lower-income parents' prioritisation of program features that optimised affordability and convenience is unsurprising as the literature has consistently highlighted practical barriers such as limited time and financial resources as barriers to lower-income parents' engagement in both in-person parenting interventions (Gross et al., 2001; Keller and McDade, 2000) and IMIs (Brager et al., 2021). The present research extends upon these previous studies by providing quantitative trading between attributes. This study shows that optimisation of these two features impacts lower-income parents' intent to enrol beyond other program features such as the type of program platform or the amount of flexibility provided to users in choosing the order of module completion, with even small increases in cost undermining parent enrolment. The DCE also showed that although the preference was less strong, higher-income parents also preferred briefer modules and cheaper programs. This preference for cheaper and briefer modules also persisted despite the intentional choice of the researchers to use attribute levels that were realistic but also not excessive to reduce the likelihood that these features would dominate parent preferences. Therefore, program developers can now have greater confidence that prioritising these two features will expand the reach of preventive parenting IMIs to parents across the socioeconomic spectrum.

Parents with no postsecondary education also had a stronger preference for brief modules, with this consistent with literature indicating that parents with less education desire simple, concise content (Chavira et al., 2017). Parents with less education prioritised 15- and 25-min modules over 45-min modules, with preferences similar across the two briefer levels. This supports qualitative evidence (Broomfield et al., 2021) suggesting that although convenience is highly sought after among this population, lower-SEP parents still recognise that adequate time is required to benefit from a parenting intervention. These parents therefore want programs that are both convenient and effective. User control of module order was also important to parents with less education, with parents with no formal postsecondary education preferring a predetermined module order. Possibly, due to parents with less education having less digital literacy (Hale et al., 2010), a more directive

approach to program navigation feels less intimidating for these parents (Van Deursen and Van Dijk, 2014).

The association between community advantage and program platform preference was not in the predicted direction. Parents living in disadvantaged areas, particularly regional and rural areas where internet access is more limited (Alam et al., 2019), have expressed a preference for downloadable content through smartphones and tablet devices (Broomfield et al., 2021), however in the present study parents living in areas of greater disadvantage appeared to prefer website-based programs. The interactions between community advantage and the remaining features were also unexpected and may be better explained by parents' engagement in the DCE. Despite efforts to minimise non-engaged responding, including removing participants with strong left/right bias, long response runs and fast completion times, it is possible that there was a greater rate of nondifferentiation among remaining participants from low advantage areas. Inclusion of additional attention checks could support future studies to investigate if such findings are related to engagement. Furthermore, research has shown that area-based indicators of socioeconomic disadvantage, such as SEIFA, are poor indicators of individual-level SEP, particularly in Australian samples (Lim and Gemici, 2011). As such, these findings should be interpreted with caution as further research is required.

Based on findings from the present study, some IMIs for youth mental health might expect to have greater success at reaching lower-SEP parents, due to their inclusion of preferred features. For example, Parent-Works (Piotrowska et al., 2020), Parenting Resilient Kids (Fernando et al., 2018; Sim et al., 2020) and Partners in Parenting (Cardamone-Breen et al., 2018; Yap et al., 2018; Yap et al., 2019) are all free IMIs, with modules varying between 15 and 30 min. However, despite incorporating these desired features, these IMIs still faced difficulties enrolling lower-SEP parents, with greater participation among higher-educated and higher-income parents (Cardamone-Breen et al., 2018; Piotrowska et al., 2020; Sim et al., 2020). Low enrolment of lower-SEP parents in programs with these desired features suggests that further consideration of lower-SEP parents' needs in the design and promotion of IMIs for youth mental health is warranted. Implications from this unexpected pattern of findings include increasing the customisability of programs and tailoring promotional materials to better reach lower-SEP parents, with these suggestions expanded upon in the implications section below.

4.1. Study strengths and limitations

A major strength of this study is the rigour of the DCE methodology and its novel application in this field. The use of qualitative data to inform the development of attributes and levels has been shown to improve the external validity of DCE choices (Coast et al., 2012). Therefore, the present DCE likely yielded results with strong external validity due to attribute development being informed by qualitative research (Broomfield et al., 2021). Additionally, despite this exploratory study being the first to utilise a DCE to investigate parents' preferences for preventive parenting IMIs, it included a sample with varying levels of socioeconomic advantage to explore preferences across SEPs, as well as multiple measures of SEP to explore heterogeneity among lower-SEP parents. These choices bolster the likelihood that findings can be translated into engaging, appealing programs for parents across the socioeconomic spectrum.

Due to the exploratory nature of this study a conservative approach to statistical power was required and therefore only four attributes were included in the DCE design. These attributes were included based on a strict selection process (Helter and Boehler, 2016), however other program features likely also influence parents' intent to enrol. For example, studies have found that therapist contact may be particularly important to lower-SEP families (Harris et al., 2020; Jones et al., 2013). Therefore, future studies should utilise larger DCE designs with more attributes and levels to gain a more comprehensive view of parents' preferences for

preventive parenting IMIs for youth mental health. Furthermore, due to sample size and design considerations, interaction effects between attributes and additional socio-demographic variables could not be examined, with this also warranting further attention in future studies.

A further methodological limitation of this study that may undermine the generalisability of findings, is the exclusion of an opt-out alternative in the DCE design. Providing an opt-out or no-choice option in DCEs (Campbell and Erdem, 2019), or alternatively a dual-response design (Veldwijk et al., 2014), can improve the external validity of findings in different research contexts, however the conservative statistical approach required of this exploratory study did not support the inclusion of such options in the present design. Future studies should consider the inclusion of a no-choice or dual-response options in DCEs investigating preferences for prevention programs.

4.2. Implications for research, policy, and practice

Findings from this study offer program developers several recommendations for increasing the reach of preventive parenting IMIs aimed at the prevention of youth mental health difficulties. Based on parents' preferences, optimising the affordability and convenience of programs will likely lead to the greatest increase in uptake. This study highlighted the role program cost and module length can play in optimising such qualities, however other features could also be considered, such as payment plans or ongoing access to content. Features such as application-based programs and predefined module order will likely also increase the reach of these programs among parents with limited household income and education (McCurdy and Daro, 2001).

The heterogeneity in program preferences observed in this study, and previous literature (e.g. Mendez et al., 2009), may contribute to the ongoing difficulties in reaching lower-SEP parents with universal prevention programs if not addressed (Cardamone-Breen et al., 2018; Piotrowska et al., 2020; Sim et al., 2020). The present study highlights that whilst certain features are desired by most parents (i.e. low cost and brief modules), other features are only preferred by certain lower-SEP parents (i.e. application-based programs for lower-income parents, and predefined module order for parents with less education). As such, a "one-size-fits-all" program may not appeal to all lower-SEP parents. Instead, IMIs may benefit from incorporating greater customisability into their designs to allow parents to tailor program features based on their individual preferences. Additionally, the heterogeneity in parent preferences found in this study highlight the importance of adequate representation of parents with varying social and economic experiences when developing and evaluating preventive parenting programs (Chacko et al., 2016).

Comprehensive, multi-staged strategies may be needed to overcome lower-SEP parents' barriers to engagement. A systematic review by Hansen et al. (2019) found that IMIs that utilised multiple engagement enhancement strategies to target underserved populations were more effective at increasing engagement with these populations. As such, ensuring programs are convenient and affordable may not result in increased enrolment by lower-SEP parents unless additional steps are also taken to reach these parents. Strategies could include targeted recruitment campaigns, co-designed features and ensuring promotional materials highlight desired features (Hansen et al., 2019). A recent conceptual framework of initial engagement in preventive parenting programs (Finan and Yap, 2021) highlights that a socio-ecological lens may further support parental enrolment, whereby factors across several levels are targeted. Therefore, broader health promotion campaigns to support the awareness and perceived value of preventive parenting IMIs among this population may also support improved reach.

Further empirical evidence is needed to support the use of program features identified as important in the present study. Whilst this study provides insight into parents' stated preferences, the feasibility and acceptability of these modifiable program features needs to be further assessed systematically in efficacy and effectiveness trials. This

additional avenue of enquiry will help determine if altering programs based on the stated preferences obtained in this study will successfully expand the reach of preventive parenting IMIs to parents across the socioeconomic spectrum.

Finally, this study demonstrates the DCE as a feasible method for eliciting preference data from difficult-to-reach populations. Due to lower-SEP parents being consistently under-represented in parenting research (Eisner and Meidert, 2011; Fossum et al., 2018), studies have reported difficulty in determining their program preferences and usage patterns (Chacko et al., 2016; Finan et al., 2018). However, this study effectively used a novel DCE design to gather stated preferences from this underserved population. Similar research designs may be used with other under-represented populations to facilitate appropriate and equitable interventions for underserved groups, ultimately reducing existing mental health inequalities.

4.3. Conclusion

The present study provides valuable insights into the relative influence of program features on parents' intent to enrol in preventive parenting IMIs for youth mental health. It also highlights the influence of different socioeconomic factors on parent preferences. Results indicate that making programs cheaper and modules shorter will likely have the greatest impact on overall parental enrolment. However, parents' unique preferences associated with their education level, household income, and community advantage also need to be considered when designing programs to ensure interventions have broad appeal, with customisability particularly relevant. This research underscores the importance of including parents with different socioeconomic experiences in the design and evaluation of IMIs for youth mental health, as without adequate representation existing inequalities will likely be exacerbated by the growing prevalence of IMIs for youth mental health.

Supplementary data to this article can be found online at https://doi.org/10.1016/j.invent.2022.100522.

CRediT authorship contribution statement

Grace Broomfield: Conceptualization, Methodology, Investigation, Formal analysis, Visualization, Project administration, Writing – original draft. **Scott D. Brown:** Methodology, Formal analysis, Supervision, Writing – review & editing. **Marie B.H. Yap:** Conceptualization, Methodology, Supervision, Writing – review & editing.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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