Applying choice experiments
to the
design of social programs

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Abstract

In recent literature on social program design, researchers have started to investigate the use of stated choice (conjoint) methods to design programs. Two key insights form the basis for applying such experimental methods to social policy design. First, social policies can be modelled as having independent attributes or features that together form the policy package. Second, policy clients, the target actors, can evaluate and rate the relative attractiveness of various policy packages.

This paper explores the use of stated choice to design social programs, based on programming supported by the National Child Benefit (NCB), Canada's main social safety net program for lower income families. The conclusion quite naturally is that NCBS recipients prefer cash equivalents in the form of vouchers for clothes and food, but are less interested in increases in the base subsidy or subsidized childcare.

1.0 Introduction

In recent literature on social program design, researchers have started to investigate the use of stated choice (conjoint) methods to design programs.[1] Two key insights form the basis for applying such experimental methods to social policy design. First, social policies can be modleled as having independent attributes or features that together form the policy package. Second, policy clients, the target actors, can evaluate and rate the relative attractiveness of various policy packages.

The NCB, though the provincial and territorial reinvestment process, includes a wide array of components (childcare, earnings supplements, early childhood programs, cash benefits, etc.). This paper explores the use of stated choice to design social programs, using the programming supported by the National Child Benefit (NCB), Canada's main social safety net program for lower income families.

2.0 Stated choice experiments and policy design

For this analysis, we make two important assumptions not typical for social program design:

- In designing program features, we assume that NCB recipients can be viewed as *clients* and that they accept this characterization. This is necessary for us to create a frame of reference that allows us to measure the stated utility (demand) for various types of programs.

- We assume that it is possible to isolate program features as discrete and separable *attributes* that clients can assess both independently and together. For example, clients must accept that cash benefits, childcare, health services, transit passes, food banks, etc. may be viewed as discrete attributes that together comprise a "program." Each program feature has different levels, such as a certain value of cash benefit, having or not having a

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[1]   See Spoth (1993, 1996).

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transit pass, etc. The extent to which NCBS recipients accept this characterization is critical for the success of the methodology. The paper describes the methods used to explain this to study subjects.

2.1 Stated choice experiments: overview

Stated choice methods map consumer preferences across a range of products or services so that individual features can be studied both independently and simultaneously. The term *conjoint* is a contraction of <u>con</u>sider <u>joint</u>ly.[2] For example, understanding the preferred features in a car requires a framework that rates all attributes simultaneously rather than sequentially. In a standard consumer preference questionnaire administered over the phone, the respondent might rate attributes of a car (power, colour, capacity, economy, etc.) sequentially using various rating scales. Once the respondent has offered the ideal car, the researcher may ask a willingness-to-pay question and discover that these preferred features are not preferred for the price. In contrast, the stated choice approach replicates the true decision-making process used by consumers by presenting a fixed set of alternatives (called plans) that offer various product or service features, one of which may be price. The consumer then rates each plan on a scale of desirability (usually 1 to 10). The typical car purchaser reviews the features or attributes of each car, the amount of each attribute, and then makes a choice that maximizes utility within the budget. Often, the budget constraint moves to accommodate a certain level of an attribute (such as fuel economy); however, this does not violate the basic idea. It is possible to introduce other information such as income as a covariate to condition these choices.

This technique requires that attributes and levels offer a reasonable and realistic description of a product. This is termed *salience,* and, without it, the conjoint method fails. To reiterate this key assumption, respondents must understand and accept that a product or service comprises discrete attributes, each with at least two levels, and that the set of attributes and levels present a reasonable description of the product or service. If the respondent cannot visualize the product or service options based on the attributes and levels, his/her ratings will be neither valid nor reliable.

The collective attributes or a product or service should also present a balanced perspective and not result in a single dimension being the obviously dominant feature. Certainly, in product research on vehicles, some consumers will react primarily to price, and others will be most interested in other attributes such as fuel economy, but consumers should consider all attributes in their decision-making.[3]

A conjoint study may be implemented in a mailed questionnaire, an Internet survey, or a focus group setting. Because each respondent provides several product evaluations of different products (say four), a focus group of 10 respondents produces 40 observations. In 20 focus groups, each with 10 participants, respondents will produce 800 individual ratings. This is a

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[2]   A recent reference for these methods is Louviere, J., D. Hensher and J. Swait. (2000). *Stated Choice Methods Analysis and Application.* Cambridge: Cambridge University Press.

[3]   One approach is to have a consumer rate each attribute on its overall importance to him/her using a five-point scale or by allocating each a share of points out of 100. The consumer can rate one of the attributes as 100 and offer 0 to the others or allocate 25 points to each of the four attributes. This share rating then becomes a covariate in the regression model.

common scale for qualitative research in marketing and program evaluation studies and presets the attractive benefit that the results of these ratings may be treated in a multivariate model.

A final important feature of conjoint studies is their ability to support experimental variation in the attributes and levels. Although is it conceptually possible to present consumers with all possible attribute/level combinations for a product or service, the limitations to human cognitive processing will necessitate a reduction in decision-making complexity through experimental design.

2.2 Designed experiments

A designed experiment consists of a trial or a series of trials in which the researcher makes purposeful changes to the explanatory/predictor variable(s) – factor(s) of a system in order to observe and identify possible explanations for changes in the response variable. One of the simplest forms of a designed experiment is the double blind experiment (the treatment assignment/factor levels being presented are concealed from both the experimenter and the participant), with only one factor X_1, in this case whether the treatment (e.g., drug) is administered or not.

$$Y_i = f(x_{i1}) + e_i \tag{1}$$

where i represents the different factor levels (doses) of the factor x_1. Controlling for all other influences, as in a true experiment, this type of model shows the level of x_1 that yields the highest value of Y.

For simplicity, consider a two factor model, where each factor consists of two levels. This model single factor model now appears as:

$$Y_i = b_0 x_{i0} + b_1 x_{i1} + b_2 x_{i2} + b_{12} x_{i12} + e_i \tag{2}$$

Here, i refers to the number of trials (respondents or observations), and there are two factors, x_{i1}, x_{i2}, where

  $x_{i1} = +1$ for the first level and -1 for the second level
  $x_{i2} = +1$ for the first level and -1 for the second level
  $x_{i0} =$ a vector of 1's .[4]

The variables b_1 and b_2 measure the main effects on the single factors x_{i1} and x_{i2}, where i indexes the observation. The interaction term $x_{i12} = x_{i1} * x_{i2}$ is often termed the first order interaction with the effect measured by b_{12}. In models with more factors, higher order

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[4]   Note: This is a coding scheme to label levels, not a dummy variable coding as used in multivariate statistical models.

interactions may appear as $x_{i123} = x_{i1} * x_{i2} * x_{i3}$ with the effect designated as b_{123}. It is possible to extend the model in (2) to as many interactions as will be supportable by the number of factors.

Models that test only main effects do not specify interaction terms and focus on estimating B_1 - B_k. Aside from the prudence of proceeding carefully where research shows little about how factors influence outcomes, one also needs to be sure that interaction terms make sense. Because this research applies conjoint to a unique service - support provided to low income families - and to a unique group, namely low-income families, this paper focuses on the basic model without interaction terms.

2.2.1 Factorial design experiments

The model of k factors in equation 2, each with two levels, is known as a 2^k factorial design. A factorial design experiment is an exploratory experimental technique. One advantage of factorial designs is their efficiency in analyzing the effects of several factors on a response variable compared to one-factor-at-a-time experiments.

Returning to the 2^k factorial model, in a complete experiment, researchers typically explore all possible combinations of the factors and main effects as well as all possible interactions. This requires a series of 2^k trials. For example, two factors and two levels, would require $2^2=4$ trials. A three-factor experiment with two levels would require $2^3=8$ trials; a four-factor experiment would require $2^4=16$, and so forth. Factors with three levels can dramatically increase the number of required trials. A two-factor model with three levels requires $9(3^2)$ trials and a two-factor model with 5 levels requires $25 (5^2)$ trials. Clearly practical considerations will limit the scope of the experiment.

Consider the three-factor, two-level experiment that requires eight trials. Table 1 illustrates the standard eight treatment combinations that (when run randomly) allow us to make full use of the factorial design.

Table 1: Standard treatment combination matrix for a full 2^3 factorial design experiment			
Treatment	Factor		
	X_1	X_2	X_3
1	-1	-1	-1
2	1	-1	-1
3	-1	1	-1
4	1	1	-1
5	-1	-1	1
6	1	-1	1
7	-1	1	1
8	1	1	1

Recall $X_k = -1$ refers to factor k at its first level; $X_k = +1$ refers to factor k at its second level. Hence, treatment one in the above table would be run with all three factors at their first level, and treatment two would have factor X_1 at its second level and the other two factors at their first level, and so on.

It seems rather effortless to randomly run a set of 8 or 16 or even 32 trials based on the standard factorial matrix for two-level factors, but what happens with seven factors at two levels each (2^7=128 trials), or perhaps four factors at three levels each (3^4=81 trials)? This may be feasible in trials that involve physical processes, but in social settings, creating experiments with a large number of trials is not logistically feasible. Participants do not have the cognitive capacity to sort out all the features and levels and provide a rating on each.

2.2.2 Fractional factorial designs

Considering the exponential increase in the number of trials required to run a full factorial experiment, as well as the increase in the number of interaction terms involved as the number of factors and/or factor levels of an experiment increase, running a full factorial experiment can be cumbersome.

In a well-defined fractional factorial design, the main and low-order effects are usually confounded with high-order interactions. Known as the "sparsity of effect" principle, this is the key idea behind a fractional factorial design. Under this principle, any consumer choice rests primarily on the main and low-order interactions.

Consider a 2^5 factorial design, which under a full experiment would require 32 trials. By opting for a half fractional design (2^{5-1}), only 16 trials need be run with only a small loss of information on high-order terms. In the optimal fractional design, the main effects are confounded with four-factor interactions, and two-factor interactions with three-factor interactions. Using the sparsity of effect principle, we assume that effects are actually due to the main and two-factor interactions.

As Neter et al (1996) and Montgomery (1991) explain, the idea behind fractional factorial design is to select cells within the design matrix (see Table D1) to isolate the main effects and first order interactions. Even using a fractional factorial algorithm (such as is available in SPSS) may result in too many options for subjects to rate, and one may need to allocate subsets of the design randomly in a second round. It is important that respondents receive these subsets using a randomized process and that the numbers completing the subsets are balanced.

Fractional factorial designs with additional experimentation may also be projected into stronger and larger designs in a subset of significant factors, or may be used as a sequential experimentation technique, where two or more separate fractional runs may be combined into a larger design. Hence, on a more practical basis, fractional factorial designs allow for efficiency, savings, and a more manageable number of runs to obtain preliminary information.

Using a regression model supports the efficient estimation of effects (main and interaction), which amounts to an analysis of variance estimation. If additional variables are included, it can be possible to improve the estimation (in which case we are using an analysis of covariance). In exploratory analyses, only main effects may be studied. Once these are understood, the research can include interaction terms in the estimation process. However, interactions can be tricky especially when the effects are coded as dummy variables in which case estimation often fails due to collinearity.

We elected to collect data for conjoint analysis within the context of the focus groups conducted for the NCB evaluation. A mailed questionnaire requires a high level of understanding about the products/services being tested by the respondent. In addition, respondents need to be able to complete the form unaided. Given the limited access of respondents to the Internet, that mode was clearly unacceptable. Therefore, the focus groups were a convenient way to get clients to participate. Further, because the educational background and language capacity of participants varied (from less than Grade 8 to university), having the moderator support the completion of the conjoint questionnaire was very important.[5] However, because the focus groups had other objectives as well, the conjoint exercise could only occupy a short time within each group.

3.0 Implementing a choice experiment for social programs

The standard data collection methods common to market and social research all support choice experiments to varying degrees. However, as the experiment becomes more complicated, data collection methods such as telephone surveys can become more difficult for respondents to process alternatives. Internet and mail survey methods are more successful because respondents can take time to ponder their choices in much the same way a consumer deliberates over a product or service offering. Focus groups work well in presenting unfamiliar options, such as social policy.

3.1 Participant selection

Focus group participants were involved in the conjoint exercise using the following process:

- Respondents to the NCBS client survey were asked whether they would be willing to attend a focus group. About 80% indicated their willingness to participate.[6]

- Because the NCBS client survey was national in scope, respondents resided in both large cities and remote rural areas. Logistically, focus group enrolment could only proceed in centres where sufficient numbers of willing respondents resided.

- In total, we enrolled 169 participants in 20 groups at various locations in Canada. The groups covered a range of issues facing low-income parents, and concluded with the conjoint exercise using a written questionnaire.

- Each questionnaire presented a different series of social policy options that respondents evaluated and rated on a scale that ranged from 1 to 10.

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[5]   For example, moderators stressed that the responses pertained to the respondents' situation "right now" and were not to reflect choices that were ideal for everyone. The format of the stated choice questionnaire also needed to be explained to ensure that everyone responded consistently.

[6]   This survey is detailed in NCB (2003a)

3.2   Structure of the stated choice questionnaire

The program components (or "attributes") emerged by looking at the total package of Canada Child Tax Benefits and NCB reinvestments, and by consulting with the Federal Provincial Territorial Evaluation Working Group. Both the attributes and the levels of each attribute need to be defined within the scope of the social program. It is important to select attribute/level combinations that respondents are likely to value and represent options that are feasible to offer That being said, until one actually presents the stated choice model to participants, it is never certain how they will value any attribute/level combination. One can never be certain that the levels are appropriate until an experiment has been completed. An initial test of appropriateness is whether variation exists in the ratings among the plans, which it does in this case, as shown in Section 4.1 below.

The attributes tested appear in Table 1. Three attributes have two levels, and two attributes have three levels. In retrospect, and in light of the analysis presented below, the levels for the additional monthly cash benefit could have been widened to $100 and $200, and similarly for the cash values on the vouchers. The levels of other attributes do introduce sufficient variation into the plans.[7]

Table 1: Attributes and levels for the conjoint experiment			
Attributes	**Levels**		
Additional monthly cash benefit	No cash benefit	$50 per month	$75 per month
Additional childcare while working	$2.50 cost per child per day	Free childcare	-
Voucher for food	No voucher	$50 per month	$75 per month
Voucher for clothing	No voucher	$75 per month	-
After school club (recreation and homework help for children)	$1.50 per child per day cost	Free after school club	-

It is easy to see that the portfolio of interventions excludes some important aspects of the NCBS policy earnings supplements or the range of services such as infant nutrition or programs for youth at risk. Several constraints govern the choice of program components:

- The choices needed to be consistent and realistic for participants in each jurisdiction.[8] There was no point in testing interventions that are not offered across the country.

- It was necessary to use simple program components that all participants would understand.

- The set of components needed to form elements of a credible *hypothetical* plan that respondents could visualize government as offering. Table 2 provides an example of a typical plan.

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[7]   A key concern in conjoint studies is not to widen the range of the attribute too much, thereby allowing a single attribute to dominate the rating. For example, increasing the additional cash to $500 a month might have made this so attractive that it became the only significant factor in determining the variation in the rating. In this setting, it is important that the cash equivalent of the attributes remain comparable. For example, an additional childcare subsidy of $2.50 per day is roughly $50 per month.

[8]   Please see Technical Document #7 for a summary of the sites where we convened focus groups.

Table 2: Typical plan	
Program component (Attributes)	**Plan "X"**
Additional monthly cash benefit	$75 per month
Additional childcare while working	$2.50 cost per child per day
Voucher for food	$50 per month
Voucher for clothing	No voucher
After school club (recreation and homework help for children)	Free after school club

The total number of plans for this experiment is 72 (3x2x3x2x2), but with a fractional factorial design, this falls to 16.[9] Offering ratings on 16 plans remains a difficult task for a participant; therefore, we created four versions (Version A – D) of four plans each as shown in Annex B. In the focus groups, the moderator distributed the versions systematically around the table, starting with A and proceeding to D, and repeating until he/she exhausted the forms. We also distributed forms backwards (D – A) to ensure that we distributed equal numbers of versions. The systematic distribution around the table preserved randomness since the groups had no pre-assigned seating. Finally, we asked participants to rate each of the four plans on a scale of 1 to 10, where "1" is *not at all helpful* and "10" is *very helpful*. The idea was to test program options that respondents would find beneficial, but we selected the word "helpful" in the context of raising a family.

We used Questionnaire A (Annex B) as an initial assessment that the participants completed solely as an exercise to focus on the concept of a program component and to set up the conjoint exercise.[10] Questionnaire B (Annex B), with its four versions A – D, is the main conjoint data collection exercise. The focus group moderator stressed the incremental nature of the packages in the preamble to the questionnaire. We did not link responses to Questionnaire A with responses to Questionnaire B.

In total, 169 participants completed one of the versions of Questionnaire B (4 plans) for a final sample size of N = 676 independent observations. The fractional factorial design allowed us to treat the four ratings offered by a single participant as independent (orthogonal observations).

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[9] Annex A presents the entire factorial plan as produced by SPSS V 11.0.

[10] In an ideal research setting we would administer Questionnaire A before the stated choice design and use these preferences to develop the program components for application in a follow-up session. This was not possible within the constraints of this evaluation.

4.0   Analysis of conjoint data

Simple regression uses the rating from 1 to 10 offered by participants as the dependent variable. The independent variables are dummy variables formed from the attributes/levels and coded as shown in Table 3.[11]

Table 3: Independent variables created for the conjoint analysis				
Additional monthly cash benefit	**CASH1**	= 0	No cash benefit	
		= 1	$50 per month	
	CASH2	= 0	No cash benefit	
		= 1	$75 per month	
Additional childcare while working	**CARE1**	= 0	$2.50 per day per child	
		= 1	Free childcare	
Voucher for food	**FOOD1**	= 0	No voucher	
		= 1	$50 per day	
	FOOD2	= 0	No voucher	
		= 1	$75 per day	
Voucher for clothing	**CLOTH1**	= 0	No voucher	
		= 1	$75 per month voucher	
After school club (recreation and homework help for children)	**CLUB1**	= 0	$1.50 per child per day	
		= 1	Free after school club	

A component with two levels needs one dummy variable. A component with three levels requires two dummy variables.

We also introduced covariates into the analysis to understand the effect of number and age of children, education of participant, and household income on ratings of plans. Finally, we also analyzed subsets of the participants, but as we show, with fewer than 25 participants, the regression model produces less reliable results.

4.1   Summary statistics on the conjoint variables

Table 4 shows that we maintained good balance in the questionnaire versions (A – D), resulting in stable conjoint variables. The mean overall rating of all plans was 5.574 (on a 1 – 10 scale) with a standard deviation of 3.135. We confirmed this variation in the ratings by inspecting the completed questionnaires. What this shows is that participants did not simply tend to use a single rating, but they appeared to understand the exercise and used ratings that ranged from 1 – 10.

For the single-level dummy variables (CARE, CLOTH, and CLUB), mean values all lie close to .5. The mean values for the two-level dummy variables (CASH1 and CASH2 and FOOD1 and

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[11]   Linear regression is used because the factorial model is an analysis of covariance model, where main effects and interactions are linear and additive. Improved statistical fits may be possible by creating non-linear specifications, but this requires supporting theory to explain why attributes and levels might have a non-linear impact on the ratings. Again, as an exploratory study, it is wise to retain the linear model.

FOOD2) are all close to .25. This shows that the fractional factorial design and the actual execution produced a balanced design.[12]

Table 4: Descriptive statistics – overall (n=676 plans, 169 participants)		
	Mean	**Standard deviation**
Overall rating	5.575	3.126
Dummy independent variables		
CASH1	.254	.436
CASH2	.244	.430
CARE1	.502	.500
FOOD1	.247	.432
FOOD2	.253	.435
CLOTH1	.496	.500
CLUB1	.497	.500

4.2   Basic findings – main effects

Table 5 shows the overall results for the conjoint analysis without covariates. All components except *additional monthly childcare while working* are highly significant statistically. The overall regression fit of .285 for the adjusted R^2 is good for cross-sectional data.

Table 5: Conjoint results – overall (n=676 plans, 169 participants)			
Variable	**B**	**t value**	**p value**
Constant	3.029	12.233	.000
Additional monthly cash benefit CASH1 = 0 for no benefit, = 1 for additional $50/month	2.562	10.357	.000
CASH2 = 0 for no benefit, = 1 for additional $75/month	1.994	7.949	.000
Cost of childcare while working CARE1= 0 for $2.50/day, = 1 for free childcare	-.174	-.854	.393
Voucher for food FOOD1 = 0 for no voucher, = 1 for $50 per month	1.515	6.063	.000
FOOD2 = 0 for no voucher, = 1 for $75 per month	1.733	6.988	.000
Voucher for clothing CLOTH1 = 0 for no voucher, = 1 for $75 per month	1.797	8.842	.000
After school club CLUB1 = 0 for cost of $1.50 per day per child, = 1 for free after school club	-.422	-2.074	.038
Adjusted R	.285		
F (p value)	39.515 (.000)		

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[12]   The fact that these values are not exactly .5 or .25 reflects the fact that we have some minor variation in the number of responses for each version. Another reflection of the balance in the data is that the absolute value of Pearson correlations among the independent variables never exceeds .333 for CASH1 and CASH2 and FOOD1 and FOOD2. This reflects the construction of the variables and is an outcome of the design.

The expected value of the package without any component is 3.029. Adding a $50 monthly cash benefit raises the rating to 5.591 (3.029 + 2.562). A food voucher of $50 per month increases this to 7.106 and with a clothing voucher of $75 per month creates a package that has a rating of 8.9 out of 10. The additional childcare while working (CARE1) is not statistically significant and should be treated as 0. Finally, adding an after school club reduces the mean rating of the package by .422, which appears to be an anomalous result.

Another apparently anomalous result is that the inclusion of an additional monthly benefit of $75 (CASH2) increases the valuation by 1.994 compared to 2.562 for the $50 monthly benefit (CASH1). Logic would suggest that the higher the benefit, the greater the impact on the rating. Notice that in the case of the food vouchers (FOOD1 and FOOD2), the expected result occurs – the higher valued voucher increases the rating more (1.733 for FOOD2 compared to 1.515 for FOOD1). The fact that these are such statistically strong results suggests that data variability and small samples have non-biased results. Two related explanations may account for the anomaly:[13]

- First, NCBS clients value additional cash, but there is a limit to how much more they want. The increase of cash may be seen as a potential liability in terms of remaining eligible for SA.[14] An alternative hypothesis is that participants may have tried to select a "balanced plan" and selected a monthly cash amount of $50 in conjunction with other program components. The fact that the two dummy variables CASH1 and CASH2 are negatively correlated with each other suggests that the structure of the experiment may not have enforced optimum selection of a superior plan. Having participants rate only 4 of the 16 possible plans is a weakness to be sure, but it is unlikely that we could have obtained useful responses from many respondents if we had insisted that they rate all 16 plans.

- Second, the inclusion of vouchers for specific items (food and clothing) might represent a valuable addition to the portfolio. Participants may have concluded that this would help them reserve part of the monthly assistance for specific uses. In the focus groups, some participants indicated a preference for these services as opposed to cash as a form of forced budgeting. However, cash still adds the most to program ratings. (We test the interaction of additional cash and a food voucher in Table 8 below.)

The other two interesting results that emerge from Table 5, especially in light of the conventional wisdom and the focus group results, are that although additional childcare works, it has no impact on the rating, and that after school care has a negative impact.

- The counter-intuitive childcare result is the easier of the two to explain. Many participants with children under six expressed ambivalence about working while they had young children. Some stated that they would never send their children to daycare or babysitting. Women who were married and "stay-at-home mothers" were especially clear on this point. This means that among the participants, we would expect that there are people who value this component highly and people who do not care for it at all.

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[13]   We checked the coding on the dummy variables carefully to ensure that a simple inversion of labels had not produced this result.

[14]   Sample size restrictions impede an SA and non-SA analysis of this issue.

- Similarly, the after school club is valued only by participants with older children, but the total sample includes a diversity of parents with children of various ages and with different needs.

To probe these seemingly contradictory results further, we explored the effect of both adding covariates and estimating the model on specific subsets of the data. Whether a participant has children under six, the total number of children in the household, and the participant's educational level may affect the rating of various packages. We inserted a range of covariates into the regression model, including:

- marital status
- number of children <18
- number of children < 6
- education
- gross income from all sources
- age.

Table 6 shows the results.

Table 6: Conjoint results – with covariates (n=676 plans, 169 participants)			
Variable	B	t value	p value
Constant	2.899	4.310	.000
Additional monthly cash benefit CASH1 = 0 for no benefit, = 1 for additional $50/month	2.577	10.227	.000
CASH2 = 0 for no benefit, = 1 for additional $75/month	1.959	7.680	.000
Cost of childcare while working CARE1= 0 for $2.50/day, = 1 for free childcare	-.164	-.794	.428
Voucher for food FOOD1 = 0 for no voucher, = 1 for $50 per month	1.505	5.917	.000
FOOD2 = 0 for no voucher, = 1 for $75 per month	1.743	6.876	.000
Voucher for clothing CLOTH1 = 0 for no voucher, = 1 for $75 per month	1.778	8.599	.000
After school club CLUB1 = 0 for cost of $1.50 per day per child, = 1 for free after school club	-.432	-2.090	.037
Marital status (0=single, 1=couple)	.188	.810	.418
Number of children > 6	-.127	-.787	.431
Number of children < 6	-.217	-1.235	.217
Education	.0004	.009	.993
Gross income from all sources	.0002	2.958	.003
Age of respondent	.003	.181	.857
Adjusted R	.295		
F (p value)	21.782 (.000)		

Three important results emerge from Table 6:

- None of the covariates makes a substantial difference to the coefficients on the attributes (program components). All retain their same general magnitude, sign, and statistical significance. This implies that the model performs well and results are robust.

- Only gross income is statistically significant (with a p value of .003), but its impact on rating is negligible.

- Including the number of children under six as a covariate has no impact on the results. This suggests that the alternative approach of analyzing Table 6 for different subsets ought to be explored.

Table 7 shows the results for single parents and dual parents[15] within the data. We have varied the reporting format to allow a closer comparison of results.

Table 7: Conjoint results – marital status (n=676 plans, 169 participants)				
Variable	Single parents (n=452 plans, 113 participants)		Dual parents (n=224 plans, 56 participants)	
	B	p value	B	p value
Constant	3.081	.000	2.919	.000
Additional monthly cash benefit CASH1 = 0 for no benefit, = 1 for additional $50/month	2.800	.000	2.059	.000
CASH2 = 0 for no benefit, = 1 for additional $75/month	2.022	.000	1.886	.000
Cost of childcare while working CARE1= 0 for $2.50/day, = 1 for free childcare	-.397	.111	.291	.419
Voucher for food FOOD1 = 0 for no voucher, = 1 for $50 per month	1.503	.000	1.414	.002
FOOD2 = 0 for no voucher, = 1 for $75 per month	1.775	.000	1.611	.000
Voucher for clothing CLOTH1 = 0 for no voucher, = 1 for $75 per month	1.773	.000	1.917	.000
After school club CLUB1 = 0 for cost of $1.50 per day per child, = 1 for free after school club	-.624	.012	-.035	.923
Adjusted R	.307		.237	
F (p value)	29.503 (.000)		10.914 (.000)	

Only slight differences exist in the ratings offered by single parents and dual parents. Cash benefits are slightly less important to dual parents, and they value food vouchers less than single parents. However, they appear to value clothing vouchers slightly more. Some larger differences exist in CARE1 and CLUB1, and the signs of coefficients reverse, but these parameters remain statistically insignificant and should be considered as zero.

Finally, we explored selected higher order interactions. First, note that two of the factors have three levels and require two dummy variables to express. We created two hybrid variables that combined the monthly cash increment into a single payment (CASH_TOT = 0 if CASH1 and

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[15] We defined "married" to include a common-law relationship and "single" to include divorced and separated.

CASH2 = 0 and CASH_TOT = 1 if CASH1 or CASH2 = 1) and similarly (FOOD_TOT = 0 if FOOD1 and FOOD2 = 0 and FOOD_TOT = 1 if FOOD1 or FOOD2 = 1). We then created the following selected interactions:

- CASH_CRE = CASH_TOT*CARE1 (the interaction of cash and childcare subsidy)

- CASH_FOD = CASH_TOT*FOOD_TOT (the interaction of cash and food vouchers).

Table 8 presents the results of the estimation.

Table 8: Conjoint results – all respondents (n=676 plans, 169 participants)		
Variable	**B**	**p value**
Constant	3.085	.000
Additional monthly cash benefit CASH1 = 0 for no benefit = 1 for additional $50/month	2.259	.000
CASH2 = 0 for no benefit = 1 for additional $75/month	1.884	.000
Cost of childcare while working CARE1= 0 for $2.50/day = 1 for free childcare	-.799	.023
Voucher for food FOOD1 = 0 for no voucher = 1 for $50 per month	2.353	.000
FOOD2 = 0 for no voucher = 1 for $75 per month	1.939	.000
Voucher for clothing CLOTH1 = 0 for no voucher = 1 for $75 per month	1.793	.000
After school club CLUB1 = 0 for cost of $1.50 per day per child = 1 for free after school club	.421	.038
Interaction of additional monthly cash and food voucher CASH_FOD = 1 for both, = 0 for neither or one = 0	-1.055	.009
Interaction of additional monthly cash and childcare subsidy CASH_CRE = 1 for both, = 0 for neither or one = 0	1.264	.027
Adjusted R	.296	
F (p value)	32.493 (.000)	

Table 8 closely replicates the results presented in Table 5 for the main effects. The two interaction terms produce interesting results:

- The coincidence of an added cash benefit and a food voucher has a negative impact on the rating of a plan of -1.055. It is curious that the two main effects of cash and food voucher increase the rating, but their interaction reduces it.

- The coincidence of a monthly cash benefit and childcare subsidy increases the rating by 1.264.

Interaction terms always pose difficulties in interpretation. These results may indicate that the attributes are not sufficiently well specified or that respondents had some difficulty completing the exercise after a two-hour discussion in the focus group.

5.0　Caveats and limitations

Because this is an experimental study with a group that is rarely treated as "consumers," we elected to apply a simple conjoint model. We tested primarily main effects and modelled only limited interactions among the levels of attributes. We also coded the attributes and levels as dummy variables and used regression, rather than using other procedures common to many conjoint studies. The regression approach supports a straightforward interpretation of the results in a format that has implications for policy.

The following caveat is important. An apparent anomaly in the analysis is that the availability of free childcare failed to elicit a strong vote from the group, even when we separated participants into single parents and dual parents. The focus groups themselves, other research, and social policy advocates have argued strongly that help with childcare costs is essential to encouraging increased workforce participation by women. Several possibilities exist to explain the fact that free childcare is not valued in this experiment:

- It is possible that participants failed to view free childcare as a program component, unlike the other elements that are goods or services. They may not view support designed to increase labour force participation as a program component to assist the family. Indeed, participants may have viewed it as a process to allow government to reduce programming by encouraging women to leave SA.

- The experiment applies to the entire group; when we complete the analysis on subsets – such as single parents who may value childcare more strongly – we encounter small sample sizes that limit analysis.

- Within the focus groups, some women expressed strong feelings about being expected to work when they preferred to receive support to raise their children. Even some of those employed full-time expressed reservations about leaving their children to go to work.[16]

- Most importantly, many women have access to free or at least significantly subsidized childcare; therefore, they would not value extra benefits.

This result illustrates the complexity of designing program components, especially in social policy areas. Extensions to the experiment clearly call for enrolling target groups, such as single parents with children between one and six, to assess the value of free childcare as one of the program components offered.

Respondents overwhelmingly prefer receiving cash benefits and the cash equivalent of a voucher for food or clothing and paying for childcare and after school clubs themselves. Any stigma that might be associated with vouchers is not evident from this research.

Some results clearly call for caution. It would be premature to conclude that these results overturn the common conclusion of decades of research of the importance of childcare to increased labour force participation. All these results indicate is that 169 clients, when placed in a stated choice experiment, did not value free childcare as a program component to help their families.

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[16]　　See Technical Document #7 for more details on this point.

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ANNEX A

FRACTIONAL FACTORIAL PLANS

Fractional Factorial Plan								
	Plan 1	**Plan 2**	**Plan 3**	**Plan 4**	**Plan 5**	**Plan 6**	**Plan 7**	**Plan 8**
Additional monthly cash benefit (*above what you are getting now*)	You get $75 per month	You get no cash benefit	You get $75 per month	You get $75 per month	You get no cash benefit	You get no cash benefit	You get $75 per month	You get no cash benefit
Cost of childcare while working	You pay $2.50 per child per day	You get free childcare	You get free childcare	You get free childcare	You pay $2.50 per child per day	You pay $2.50 per child per day	You pay $2.50 per child per day	You get free childcare
Voucher for food (*can only be spent on food*)	You get $75 per month	You get no food voucher	You get no food voucher	You get $50 per month	You get $50 per month	You get $50 per month	You get no food voucher	You get $75 per month
Voucher for children's clothing (*can only be spent on clothing*)	You get $75 per month	You get $75 per month	You get no clothing voucher	You get $75 per month	You get no clothing voucher	You get $75 per month	You get no clothing voucher	You get $75 per month
After school club – recreation and homework help for children	You get free after school club	You pay $1.50 per child per day	You pay $1.50 per child per day	You get free after school club	You get free after school club	You pay $1.50 per child per day	You pay $1.50 per child per day	You pay $1.50 per child per day
	Plan 9	**Plan 10**	**Plan 11**	**Plan 12**	**Plan 13**	**Plan 14**	**Plan 15**	**Plan 16**
Additional monthly cash benefit (*above what you are getting now*)	You get $50 per month	You get no cash benefit	You get $50 per month	You get no cash benefit	You get no cash benefit	You get no cash benefit	You get $50 per month	You get $50 per month
Cost of childcare while working	You pay $2.50 per child per day	You pay $2.50 per child per day	You get free childcare	You get free childcare	You get free childcare	You pay $2.50 per child per day	You pay $2.50 per child per day	You get free childcare
Voucher for food (*can only be spent on food*)	You get no food voucher	You get no food voucher	You get $50 per month	You get no food voucher	You get $75 per month	You get no food voucher	You get $75 per month	You get no food voucher
Voucher for children's clothing (*can only be spent on clothing*)	You get $75 per month	You get $75 per month	You get no clothing voucher	You get no clothing voucher	You get no clothing voucher	You get no clothing voucher	You get no clothing voucher	You get $75 per month
After school club – recreation and homework help for children	You get free after school club	You pay $1.50 per child per day	You pay $1.50 per child per day	You get free after school club	You get free after school club	You get free after school club	You pay $1.50 per child per day	You get free after school club

ANNEX B
CONJOINT QUESTIONNAIRES

FOCUS GROUP HANDOUT A

There are various benefits, programs, and services available to help children and families. Please rate each type of benefit, program, or service listed below, in terms of its importance for you and your family.

	Very important				Not at all important
Monthly cash benefit	O_5	O_4	O_3	O_2	O_1
Attending childcare or daycare programs	O_5	O_4	O_3	O_2	O_1
Subsidies (i.e., financial support) for childcare or daycare	O_5	O_4	O_3	O_2	O_1
Prenatal care	O_5	O_4	O_3	O_2	O_1
Vouchers for food or clothing	O_5	O_4	O_3	O_2	O_1
Parenting classes	O_5	O_4	O_3	O_2	O_1
Health benefits (e.g., drug card)	O_5	O_4	O_3	O_2	O_1
Assistance finding work	O_5	O_4	O_3	O_2	O_1
Education or skills training for employment	O_5	O_4	O_3	O_2	O_1

FOCUS GROUP QUESTIONNAIRE B

**Please think about the following plans to help families. As you read about each,
think of them as "packages of programs to help families"
then, tell us what you think of each plan by rating it (from 1 to 10) at the bottom of the table.**

	Plan 1	Plan 2	Plan 3	Plan 4
Additional monthly cash benefit (*above what you are getting now*)	You get $75 per month	You get no cash benefit	You get $75 per month	You get $75 per month
Cost of childcare while working	You pay $2.50 per child per day	You get free childcare	You get free childcare	You get free childcare
Voucher for food (*can only be spent on food*)	You get $75 per month	You get no food voucher	You get no food voucher	You get $50 per month
Voucher for children's clothing (*can only be spent on clothing*)	You get $75 per month	You get $75 per month	You get no clothing voucher	You get $75 per month
After school club – recreation and homework help for children	You get free after school club	You pay $1.50 per child per day	You pay $1.50 per child per day	You get free after school club
	Ratings			
Rate each plan on a scale from 1 to 10 where 1 means "not helpful" and 10 means "extremely helpful."	**Rating** _____	**Rating** _____	**Rating** _____	**Rating** _____
	not helpful extremely helpful 1 2 3 4 5 6 7 8 9 10	not helpful extremely helpful 1 2 3 4 5 6 7 8 9 10	not helpful extremely helpful 1 2 3 4 5 6 7 8 9 10	not helpful extremely helpful 1 2 3 4 5 6 7 8 9 10

Name:_____
(For follow-up purposes)

FOCUS GROUP HANDOUT B

**Please think about the following plans to help families. As you read about each,
think of them as "packages of programs to help families"
then, tell us what you think of each plan by rating it (from 1 to 10) at the bottom of the table.**

	Plan 5	Plan 6	Plan 7	Plan 8
Additional monthly cash benefit (*above what you are getting now*)	You get no cash benefit	You get no cash benefit	You get $75 per month	You get no cash benefit
Cost of childcare while working	You pay $2.50 per child per day	You pay $2.50 per child per day	You pay $2.50 per child per day	You get free childcare
Voucher for food (*can only be spent on food*)	You get $50 per month	You get $50 per month	You get no food voucher	You get $75 per month
Voucher for children's clothing (*can only be spent on clothing*)	You get no clothing voucher	You get $75 per month	You get no clothing voucher	You get $75 per month
After school club – recreation and homework help for children	You get free after school club	You pay $1.50 per child per day	You pay $1.50 per child per day	You pay $1.50 per child per day
	Ratings			
Rate each plan on a scale from 1 to 10 where 1 means "not helpful" and 10 means "extremely helpful."	Rating _____ not helpful extremely helpful 1 2 3 4 5 6 7 8 9 10	Rating _____ not helpful extremely helpful 1 2 3 4 5 6 7 8 9 10	Rating _____ not helpful extremely helpful 1 2 3 4 5 6 7 8 9 10	Rating _____ not helpful extremely helpful 1 2 3 4 5 6 7 8 9 10

Name:_____
         (For follow-up purposes)

FOCUS GROUP HANDOUT B

**Please think about the following plans to help families. As you read about each,
think of them as "packages of programs to help families"
then, tell us what you think of each plan by rating it (from 1 to 10) at the bottom of the table.**

	Plan 9	**Plan 10**	**Plan 11**	**Plan 12**
Additional monthly cash benefit (*above what you are getting now*)	You get $50 per month	You get no cash benefit	You get $50 per month	You get no cash benefit
Cost of childcare while working	You pay $2.50 per child per day	You pay $2.50 per child per day	You get free childcare	You get free childcare
Voucher for food (*can only be spent on food*)	You get no food voucher	You get no food voucher	You get $50 per month	You get no food voucher
Voucher for children's clothing (*can only be spent on clothing*)	You get $75 per month	You get $75 per month	You get no clothing voucher	You get no clothing voucher
After school club – recreation and homework help for children	You get free after school club	You pay $1.50 per child per day	You pay $1.50 per child per day	You get free after school club
	Ratings			
Rate each plan on a scale from 1 to 10 where 1 means "not helpful" and 10 means "extremely helpful."	Rating _____ not helpful extremely helpful 1 2 3 4 5 6 7 8 9 10	Rating _____ not helpful extremely helpful 1 2 3 4 5 6 7 8 9 10	Rating _____ not helpful extremely helpful 1 2 3 4 5 6 7 8 9 10	Rating _____ not helpful extremely helpful 1 2 3 4 5 6 7 8 9 10

Name:_____
    (For follow-up purposes)

FOCUS GROUP HANDOUT B

**Please think about the following plans to help families. As you read about each,
think of them as "packages of programs to help families"
then, tell us what you think of each plan by rating it (from 1 to 10) at the bottom of the table.**

	Plan 13	**Plan 14**	**Plan 15**	**Plan 16**
Additional monthly cash benefit (*above what you are getting now*)	You get no cash benefit	You get no cash benefit	You get $50 per month	You get $50 per month
Cost of childcare while working	You get free childcare	You pay $2.50 per child per day	You pay $2.50 per child per day	You get free childcare
Voucher for food (*can only be spent on food*)	You get $75 per month	You get no food voucher	You get $75 per month	You get no food voucher
Voucher for children's clothing (*can only be spent on clothing*)	You get no clothing voucher	You get no clothing voucher	You get no clothing voucher	You get $75 per month
After school club – recreation and homework help for children	You get free after school club	You get free after school club	You pay $1.50 per child per day	You get free after school club
	Ratings			
Rate each plan on a scale from 1 to 10 where 1 means "not helpful" and 10 means "extremely helpful."	**Rating _____**	**Rating _____**	**Rating _____**	**Rating _____**
	not helpful extremely helpful 1 2 3 4 5 6 7 8 9 10	not helpful extremely helpful 1 2 3 4 5 6 7 8 9 10	not helpful extremely helpful 1 2 3 4 5 6 7 8 9 10	not helpful extremely helpful 1 2 3 4 5 6 7 8 9 10

Name:_____
    (For follow-up purposes)