

Desires for Children and their Measurement in Low Fertility Settings

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Traditional survey instruments on reproductive desires are focused on the number of children an individual ideally prefers. This approach, however, faces the problem of a low ability to predict future reproductive outcomes. Instruments that measure a hierarchy of preferred family sizes, like the instruments by Coombs (1974) and Terhune and Kaufmann (1973), are more promising, because they inform about latent desires for smaller or larger families. Surprisingly, these instruments are up to now neither applied to the low fertility contexts of Europe nor are the data they provide directly compared. The paper closes this gap by comparing these two instruments with the help of data from the Dutch LISS-Panel. Both instruments provide meaningful and similar results, also in the Dutch low-fertility context. The instrument by Coombs produces more reliable results than the instrument by Terhune and Kaufmann, but also faces more methodological problems. Both instruments are exposed to biasing forces, which are social desirability in the instrument by Coombs and placement effects in the instrument by Terhune and Kaufmann.

Keywords: reproductive preferences, decision-making, survey instruments, forced choice, pairwise comparison, reliability, social desirability, placement effects.

1. Introduction

The persistence of high family size ideals has remained a puzzle for demographers in the industrial world. Despite declines in period fertility well below replacement level, women and men have consistently responded to surveys saying they would, on average, ideally like to have two or more children (Goldstein *et al.* 2003, Testa and Grilli 2006). This finding leaves room for two different interpretations. Either as a sign of unmet demand for children and of an opportunity for pro-natalist public policies to increase achieved fertility (Chesnais 1996) or as an indicator of a possible rise of future period fertility, if tempo-depressing effects of delayed childbearing come to an end (Bongaarts 2001).

However, how accurate is our knowledge about ideal family size? This question might sound surprising at first sight. Reproductive ideals and desires are of high significance in theories of fertility (see, among others, Easterlin 1978, Hoffman and Hoffman

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1973, Lesthaeghe 1980, Nauck 2005). Moreover, questions addressing this topic have a long tradition in survey research (Heiland *et al.* 2008). Since the 1930s, surveys address people's reproductive desires by questions about their mostly preferred number of children in an ideal case, under realistic circumstances, or within a framework of fertility-related normative expectations. To our knowledge, however, these instruments were hardly critically discussed according to their methodological foundations, theoretical assumptions, or reliability and validity (Coombs 1974, Hagewein and Morgan 2005).¹ Under an empirical perspective, therefore, one has to conclude that knowledge about reproductive desires and ideal family size might still be vague.

Traditional survey instruments measure desired family size as a single number, i.e. as the number of children a person mostly prefers.² This approach, however, is problematic because of at least three reasons. (1) It does not consider the relative character of preferences. Preferences are identified by comparing different alternatives and by evaluating how much one alternative is preferred among the others. (2) Reproductive preferences are not fixed. They are moving targets that alter throughout the life course and due to changing living conditions (Lee 1980). Thus, the mostly desired number of children expressed in a survey at one period may not be stable throughout reproductive life. (3) Knowledge about the mostly desired family size is only of low predictive value. Although reproductive desires are of high importance for population forecasts (Lee 1981), their ability to predict fertility on the individual level is mixed or even poor (Westhoff 1981).³

In the 1960s and 1970s, however, there were already instruments developed that promise to overcome these shortcomings. The instruments by Coombs (1974) and by Terhune and Kaufman (1973) address the desirability of a particular number of children relative to alternative family sizes. The outcome is a hierarchy of reproductive goals, which informs about the mostly preferred number of children as well as about family sizes that are perceived as second, third, or fourth best alternatives. The information about reproductive goals ranked second, third etc., significantly improves the accuracy of predictions of individual fertility and helps to understand changes in reproductive desires (Coombs 1979b, Westhoff 1981). Thus, the instruments by Coombs and Terhune and Kaufmann have the potential to improve the accuracy of measures of reproductive

¹ There are of course exceptions. The instruments by Coombs (Goldberg and Coombs 1963, Coombs, 1974) and Terhune and Kaufman (1973) rest on explicit theoretical considerations, and the publications by Coombs (1977, 1979b), Westhoff (1981), Thomson and Brandreth (1995), or Trent (1980), for example, report tests on reliability or validity.

² See Gauthier and Bühler (2010) as well as Bühler (2012) for overviews.

³ We will subsequently not consider intentions. Desires or preferences and intentions are different theoretical concepts, address different stages in the process of reproductive decision-making, and have to be measured in different ways (Bühler 2012). According to Miller (1994), preferences determine a decision-making process. Intentions, however, are an outcome of this process.

aims and to strengthen the role of reproductive desires as determinants of fertility-related behavior.

However, in order to utilize both instruments in contemporary surveys, two general methodological questions have to be clarified. (1) To our knowledge, both instruments were up to now successfully used only in surveys that took place in high fertility contexts. The instrument by Coombs was especially used in the 1970s in the U.S. (Coombs 1979a, 1979b) and developing countries, such as Bangladesh (Ahmed 1981), Malaysia (Coombs and Fernandez 1978), Taiwan (Coombs 1977, Coombs and Sun 1981), or Mexico, Turkey, and Morocco (Coombs 1978). The instrument by Terhune and Kaufmann was only applied in the U.S. (Terhune and Kaufman 1973). Thus, both instruments were not used in surveys in low fertility contexts, like in Europe. In low fertility settings, however, it cannot be taken for granted that both tools collect information that is more valuable than the one provided by instruments addressing reproductive desires as a single number. Information on hierarchies of reproductive goals is only meaningful, if respondents report sufficient variations of reproductive aims and rank orders. Due to the small range of family size in low fertility countries, the pool of alternative family sizes is limited and may lead to a small number of different preference orders. (2) There are no publications that compare the methodological foundations, reliability, and validity of the instruments by Coombs and Terhune and Kaufmann. However, a critical methodological comparison is needed, as the two instruments measure reproductive preferences in different ways, rest on different models of rank orders, and face different methodological problems.

It is the purpose of this paper to provide some answers about these two questions. Hence, the paper is structured as follows. The subsequent chapter provides a theoretical discussion for the approach to measure reproductive preferences as hierarchies of desired family sizes. Section 3 introduces the instruments by Coombs (1974) and Terhune and Kaufmann (1973) and discusses methodological problems of the two tools. With the help of data from the Dutch LISS Panel, the usefulness of the two instruments within a European low-fertility context is explored and tested. The LISS Panel and the experimental design of the study are described in Section 4. Section 5 reports the results of the empirical analyses, which are organized along three research questions: (1) What kinds of reproductive hierarchies do the instruments by Coombs and Terhune and Kaufmann provide? Especially, how heterogeneous are these hierarchies? (2) Are there biasing effects on the reported reproductive hierarchies due to the particular designs of the two instruments? (3) How is the reliability of the two instruments? Section 6 finally summarizes and discusses the results.

2. Reproductive preferences and their measurement

Individuals' behaviors and achieved goals are, among other things, outcomes of personal desires. These depend on values and expected benefits of particular aims (Voss and Abraham 2000; Hechter and Kanazawa 1997; Friedman *et al.* 1994). Different goals are differently evaluated and are, consequently, desired with different intensity. The degree of desirability of one goal is conditional on the evaluation of its desirability relative to other aims. The relative character of desirability finally leads to a rank order or preference order of goals.

Desirability expresses in principle the expected gross benefit of an aim. Individuals, however, start to engage in an activity based on expected net benefits, i.e. by charging a goal's benefits against its costs that are caused by situational constraints or undesired behavioral consequences. Thus, an actor will not seek to achieve his or her mostly desired aim, if the expected costs are too high. In this situation, a goal ranked second or even lower on the preference order is chosen instead. This alternative objective is not an undesired one. Its expected gross benefit is lower, but its expected net benefit is higher compared to the mostly preferred aim, as it can profitably be reached within given situational constraints. If situational constraints change, however, the actor may move towards the mostly desired goal or may have to choose an aim that is located at a lower rank of preference. Although preference orders are relatively stable, they change as well due to altering attitudes, opinions, evaluations, or new personal experiences. Thus, changes of goals and behavior may not only appear due to new situations, but also because of altered expected gross benefits of goals leading to a reorganization of preference orders.

These general arguments can directly be applied to the field of fertility. As reproductive desires express the expected gross benefit of children, they significantly contribute to the understanding of fertility-related decision-making (Heiland *et al.* 2008, Easterlin 1969, Blake 1968). Distinct reproductive outcomes are differently desired, as they are associated with different levels of expected benefits (Hoffman and Hoffman 1973, Nauck 2005, Namboodiri 1972). As a consequence, different numbers and gender compositions of children as well as different timings of birth are located at distinct levels in individual fertility-related preference orders. As individuals try to reach the reproductive aim that promises to provide a net benefit at the highest or at a satisfying level, this aspired goal does not have to be the mostly desired one. The expected costs to reach this aim may be too high. In this situation, the aspired or 'realistic' goal is one that is preferred on a lower level but that promises to be satisfactorily reached under given situational constraints.

If one is interested in describing individuals' current reproductive aims, information on realistic goals is sufficient. Knowledge on preference orders is not needed. However, if one wants to understand the meanings of these goals, wants to learn some-

thing about their dynamics, and wants to understand the significance of preferences for reproductive outcomes, this information is relevant. According to the meaning of a currently aspired goal, it is important to know whether this goal is really the mostly desired one. It is typical both for traditional societies with high fertility as well as modern western societies with low fertility that many people cannot have the number of children they like to have. In traditional societies many want to have less, in modern societies many want to have more children. Traditional empirical approaches measure this discrepancy by addressing the ideal number of children and the realistic number of children. However, in order to understand this difference, one also needs information about the distance between these two goals. It makes a difference, if, for example, the realistic number of children is ranked second on individuals' preference orders or whether it is evaluated as the fourth-best alternative. In the first case, individuals are able to realize a goal that is close to their ideal, in the second case they are facing serious situational constraints leading to reproductive goals that are far away from their personal desires.

Preference orders also help to understand the dynamics of reproductive aims. As already argued, reproductive goals are 'moving targets' that are determined by changing situational constraints and preference orders. Situational constraints alter due to new living situations, live perspectives, economic conditions, etc. Preference orders change due to new levels of desirability of reproductive goals, which are again expressions of changing opinions, attitudes, or experiences. Under a prospective perspective, preference orders help to estimate the direction in which changes in desired reproductive outcomes may take place. Knowledge about alternative reproductive aims inform about latent desires for having a smaller or larger family (Coombs 1979b). Individuals adjust their realistic and ideal family sizes within this context. As a consequence, the predictive ability of desired reproductive goals significantly improves, once preference orders are considered.

Under a longitudinal perspective, preference orders help to identify the patterns of changes of reproductive goals. They provide information whether respondents change their realistic or ideal family sizes step by step, that is by substituting their first preference with the reproductive goal ranked second. They also provide insights about the paths how realistic and ideal family sizes change, converge, or become more distant. Finally, documenting the dynamics of preferences also provides information, whether fertility is an expression of reproductive goals that are stable during particular biographical periods, or whether it rests on short-term adjustments to situational constraints and personal experiences.

According to these theoretical considerations, research on reproductive decisions-making and behavior would substantially benefit from empirical data on preference orders of desired family sizes. Many surveys, however, address only the top of individuals' hierarchies by asking for the mostly desired number of children or for the

size of a family that is perceived as being realistic. However, there are also instruments on hierarchies or reproductive goals available, which will be discussed in the subsequent section.

3. The instruments by Coombs and Terhune and Kaufmann

The instruments by Coombs (Goldberg and Coombs 1963, Coombs 1974) and Terhune and Kaufman (1973) rest on the theoretical assumption that individuals have single-peaked family size utility functions: one particular number of children is associated with the highest expected utility and is, therefore, mostly preferred. Alternative family sizes promise to provide lower levels of benefits and rank lower on individual preference scales. Both instruments measure this order of reproductive goals by asking respondents to compare two different numbers of children and to decide which of the two family sizes they prefer. Due to different assumptions on the ordinal strength of reproductive goals, both instruments collect this information by different designs. The instrument by Coombs assumes a strong ordinal structure, which does not allow for equally ranked family sizes. The instrument by Terhune and Kaufmann rests on a weak order allowing for tied rankings.

3.1. The instrument by Coombs

The instrument by Coombs (1974) consists of a series of questions that directly address a preference order of desired family size. It starts with a question about the number of children respondents ideally would like to have:

“If you could start your life over again, knowing that things would turn out just about the way they have for you and your husband, what number of children would you choose if you could have just the number you want by the time you finish?” (Coombs 1974: 588)⁴

Afterwards, respondents are confronted with the hypothetical situation that they cannot have that number and that they have to decide between two alternative family sizes. The family sizes addressed in this question depend on the answer given to the first question. One alternative is one number below the ideal number of children and the other alternative is one number above:

„Suppose you couldn't have that number, but had to choose between ... and ... Which would you choose?” (Goldberg and Coombs 1963: 124)

After respondents have made their decisions, they are again confronted with the situation that they cannot have that number and that they again have to decide between two alternative family sizes:

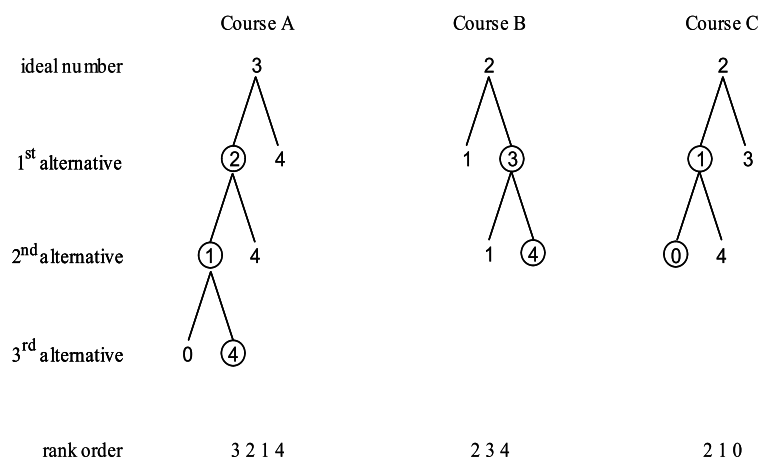
⁴ See also Goldberg and Coombs (1963) for an earlier version of this introductory question.

„If you couldn't have that, would you choose ... or ...?“ (Goldberg and Coombs 1963: 124)

The numbers of children addressed in this third question depend again on the answer given to the question before. No numbers of children are presented that a respondent has already chosen. However, the size of a family that was offered to the respondent in the question before but was not chosen is presented again together with a new alternative, which is one number above or one number below the family size that was chosen in the previous question. All subsequent questions are similar to this third question and are repeated until either the upper or the lower limit (childlessness) of possible family sizes is reached.⁵

Figure 1 shows three hypothetical courses of the instrument by Coombs with an upper limit of four children. In the first example (Course A), the respondent has named three children as his or her ideal reproductive aim. Afterwards, he or she was asked to decide between two or four children as the first alternative family size. Because the answer was two children, the next question was to decide between one child or four children. Here, the respondent decided for one child and consequently, the last decision presented to him or her was between childlessness or having four children. Due to its path-dependent design, the instrument generates a rank order of reproductive goals. Three children were the ideal goal followed by two children as the first alternative and one child and four children as subsequent optional reproductive aims. These alternative numbers of children inform about latent desires of having a smaller or larger family (Coombs 1974). The respondent likes to have three children in an ideal case, but he or she prefers to have a smaller family if this reproductive goal cannot be realized. Thus,

FIGURE 1:
THREE HYPOTHETICAL COURSES OF THE INSTRUMENT BY COOMBS



Source: Bühler *et al.* (2009)

⁵ The maximum number of children addressed in the instrument depends on a society's overall level of fertility. In high fertility countries, the questions mostly stop at "6 or more" children. For low fertility countries, however, it is meaningful to consider a range of 0 to "4 or more" children.

identical ideal family sizes have to be interpreted differently, if the respondents report different latent desires. In course B and course C in Figure 1, the ideal family size is two children, but the rank orders of alternative reproductive aims differ. In course B, the order is 2-1-0, indicating a tendency towards a smaller family. In course C, the order of 2-3-4 reports about a latent desire for having a larger family.⁶

Compared to the traditional method of pairwise comparison, which addresses all possible combinations of different family sizes, the forced-choice design of the Coombs instrument generates a rank order with a minimum number of questions. This design, however, is only possible due to the assumption of a strong ordinal structure of fertility-related preferences. Due to that, family sizes already chosen are not addressed again. Moreover, the instrument directly raises a hierarchy of numbers of children. The first question explicitly asks for the mostly desired family size and the subsequent questions give the impression to a respondent that he or she should move along his or her preference order step by step.

The instrument by Coombs, however, is associated with a variety problems. (1) There is evidence from the literature that many individuals are not certain about their reproductive goals (see, for example, Morgan 1982). Thus, they may not be able to state a clear preference for a particular family size, neither in the first question nor at one of the subsequent comparisons. (2) The series of questions starts with the request to name the ideal number of children. This kind of directly addressing the mostly desired reproductive goal was repeatedly criticized (Frohardt-Lane *et al.* 1977). Reproductive desires are a sensitive topic for many respondents. Thus, a direct question about ideal family size runs at risk to be either rejected or to be biased due to social desirability. In the latter case, respondents report a number of children they perceive as being socially accepted, but this number may not be the size of a family they personally prefer. (3) The instrument mixes preferences according to ideal family size and realistic family size (Hin *et al.* 2011). The first question clearly addresses the ideal number of children. The subsequent questions, however, confront respondents with the hypothetical situation that they cannot have that number. Thus, one has to assume that respondents start to think why they should not have that number and that they start to evaluate their reproductive preferences under realistic conditions. (4) The instrument generates hierarchies of different lengths. This is because the series of questions ends once childlessness or the upper limit of possible family size is reached. Consequently, there is no information on preference orders for all respondents who already decided for one of these two family sizes in the first question. If a respondent decided for childlessness or the highest possible num-

⁶ By transferring this ordinal information into a Coombs-Scale (Coombs 1974, van der Ven 1980), relative distances between the different reproductive goals can be computed. However, the Coombs-Scale is a general technique to quantify ordinal information and can also be applied to ordinal data collected with other instruments.

ber of children in the second question, only information about one alternative family size is available. Thus, the lengths of preference orders are determined by the ideal number of children named in the first question. Respondents with a small ideal family size resp. a large family size can only report a longer preference order if they have latent preferences for a larger family resp. a smaller family. Respondents who mostly prefer a number of children in the middle of the range of possible family sizes have to have no explicit latent desire in order to generate a longer hierarchy, i.e. they have to jump from smaller (larger) family sizes to larger (smaller) ones.

3.2. *The instrument by Terhune and Kaufmann*

The instrument by Terhune and Kaufman (1973) utilizes the traditional method of pairwise comparison (Thurstone 1927) by comparing all possible pairs of different family sizes. It rests on the assumption of a weak ordinal structure of reproductive preferences, which allows for tied rankings.

The instrument starts with a general introduction:

“Now I want to learn more about your preferences for *different* numbers of children. I have to ask you several similar questions here to get the information we need, but this part will take only a few minutes” (Terhune and Kaufman 1973, p.608).

Afterwards, respondents are asked to think about an ideal reproductive biography. The question for respondents with children is:

“Imagine once more that you could start your married life over again. Let’s suppose you could have children when you wanted them, they could be born to you or adopted, and the mixture of boys and girls was just right” (Terhune and Kaufman 1973, p.608)”

Afterwards a series of questions starts, which addresses all possible pairs of family sizes within a predefined range of numbers of children. Each pair is randomly created and is addressed by the following question:

“Suppose you had to choose between having either ... children or ... children. Which would you choose?” (Terhune and Kaufman 1973, p.608).

If, for example, the range of numbers of children goes from 0 to 5, all 15 possible combinations of family sizes are consecutively addressed to the respondent and in each case he or she has to decide for one alternative. Hence, the instrument does not directly generate a preference order. This is constructed afterwards by data analysis that counts for each family size how often it was preferred among all other numbers of children.

The instrument by Terhune and Kaufman (1973) avoids many of the problems of the instrument by Coombs. Respondents are not forced to decide for their mostly desired reproductive goal at the beginning of the series of questions and the idea of something like a hierarchy of reproductive preferences is never expressed. One has to assume, therefore, that the instrument is to a smaller degree exposed to pressures of social desir-

ability. Furthermore, the questions do not mix ideal and realistic preferences. The stimulus of ideal family size is introduced at the beginning and afterwards the respondents are only asked to decide between two alternative numbers of children. Moreover, as the respondents are not guided through a path-dependent series of questions, the instrument allows for tied rankings that may indicate uncertain reproductive preferences. Finally, as all respondents are confronted with the same number of questions, the instrument generates preference orders of equal length.

There are, however, also methodological problems. The instrument puts a high work load on respondents, as they have to go through all combinations of possible family sizes. This may lead to mechanically given answers. Moreover, respondents have to answer questions that seem to be redundant for them. If, for example, a respondent has already expressed a preference for two children among three children as well as of one child among three children, a subsequent question asking for a decision between two and four children may be puzzling for him or her.

3.3. Research questions

According to the arguments presented above, the instruments by Coombs and by Terhune and Kaufmann face open methodological questions, which have to be clarified in order to evaluate their usefulness for survey research. Moreover, as addressed in the introductory part of the paper, both instruments were up to now not applied in low fertility contexts as to be found in Europe. This leads to the following research questions.

(1) Do both instruments work satisfactorily in a low fertility setting, i.e. do they provide useful information about respondents' latent desires for larger or smaller families? In low fertility settings, the range of desired family size typically varies between 0 and 3. Thus, hierarchies of reproductive preferences will be rather short and of small variation.

(2) How serious are the methodological problems of both instruments and do they lead to biased information? The Coombs-instrument and the tool by Terhune and Kaufmann collect the same information in different ways. However, do they also provide similar results and if they do not, how much is this caused by the instrument's compelling or repetitive character? Within this context, also the question of forces of social desirability in the instrument by Coombs has to be addressed as well as the question whether this instrument forces uncertain respondents to report an unrealistic hierarchy of reproductive desires.

(3) How is the quality of the instruments by Coombs and Terhune and Kaufmann? The quality of an instrument is defined by its degree of objectivity, reliability, and validity. Throughout this paper, we will concentrate on aspects of reliability, as we used both

instruments within an experimental survey design that directly allows for tests of reliability.⁷

4. Design of the study and data

The subsequent analyses utilize data from the Dutch LISS-Panel.⁸ The LISS-Panel (Longitudinal Internet Studies for the Social Sciences) is administered by CentERdata and is a monthly online survey of Dutch households, which was explicitly created for the development and test of survey instruments. The population of the panel rests on a representative sample from the Dutch population register. In order to ensure that all individuals in the sample are able to participate in the survey, people with no computer or Internet access were equipped with appropriate hardware and software and were instructed how to use them (Scherpenzeel 2009).

In August and September 2010 the instruments by Coombs and Terhune and Kaufman were part of the LISS online questionnaire. In order to compare the results of both instruments and to test their reliability, the respondents had to reply to them within an experimental design (see Table 1). In the first wave in August 2010, respondents were randomly divided into two groups. One group, which made 60% of all respondents, had to answer the instrument by Coombs (cell 1 in Table 1). The remaining 40% replied to

TABLE 1:
DESIGN OF THE STUDY

August 2010	September 2010
<p>① COOMBS Randomly selected 60% of the respondents answer the instrument by Coombs.</p>	<p>③ COOMBS Randomly selected 33% of the respondents who have answered the instrument by Coombs in August answer the same questions again.</p>
	<p>④ MODIFIED COOMBS Randomly selected 33% of the respondents who have answered the instrument by Coombs in August answer a modified version of the instrument by Coombs.</p>
	<p>⑤ TERHUNE & KAUFMANN Randomly selected 33% of the respondents who have answered the instrument by Coombs in August answer the questions by Terhune and Kaufman.</p>
<p>② TERHUNE & KAUFMANN Randomly selected 40% of the respondents answer the questions by Terhune and Kaufman.</p>	<p>⑥ TERHUNE & KAUFMANN Randomly selected 50% of the respondents who have answered the questions by Terhune and Kaufman in August answer these questions again.</p>
	<p>⑦ COOMBS Randomly selected 50% of the respondents who have answered the questions by Terhune and Kaufman in August answer the instrument by Coombs.</p>

⁷ Analyses on the instruments' validity will be reported in a separate paper.

⁸ See <http://www.lissdata.nl/> for more information on the LISS-Panel.

the questions by Terhune and Kaufmann (cell 2). This provides the opportunity to directly compare the results of both instruments.

In September 2010, the population of respondents who answered the instrument by Coombs in the first wave was randomly divided into three groups: one-third answered the same questions again (cell 3). One-third replied to a slightly different version of the instrument (cell 4) and one-third was confronted with the instrument by Terhune and Kaufmann (cell 5). The population of respondents who answered the instrument by Terhune and Kaufmann in the first wave was randomly divided into two groups. One half answered the same questions again (cell 6) and the other half answered the questions of the instrument by Coombs (cell 7). This design allows for two different tests of reliability. First, a test-retest for the instruments by Coombs (cell 1 versus cell 3) and Terhune and Kaufmann (cell 2 versus cell 6). Second, a parallel-test by comparing the results of the instrument by Coombs with the instrument by Terhune and Kaufmann (cell 1 versus cell 5) and vice versa (cell 2 versus cell 7). This comparison, of course, does not follow a strict parallel-test design, as both instruments were not presented to the respondents within one wave.

In the case of the slightly modified instrument by Coombs (cell 4), two answer categories were added to the first question about the mostly desired number of children. Respondents could also address that they “don’t know” their ideal family size or that they “had not thought about it up to now”. This provides information about the share of respondents who may be forced by the traditional instrument by Coombs to name a preferred family size (cell 1 versus cell 4).

Among the members of the LISS-Panel, a subsample was selected for our study. This consists of persons at childbearing age, i.e. women aged 16 to 45 and men between an age of 16 and 50 years.⁹ Altogether, this made 4,018 persons. Among this subpopulation, 64,5% (2,591 persons) participated in the first wave in August 2010.¹⁰ From this population 97 respondents (3.7%) rejected to answer any question about fertility and children.¹¹ Thus, the subsequent analyses start with a population of the first wave of 2,494 participants: 1,518 persons (60.9%) replied to the instrument by Coombs, the remaining 976 individuals were confronted with the questions by Terhune and Kaufmann (see Table 2).

⁹ This age range equals to the general pattern of childbearing age in the Netherlands, which was also already used in earlier surveys on fertility-related issues in the LISS-Panel.

¹⁰ The fact that 35.5% of the selected panel members did not participate in the survey is very much caused by the optional character of the LISS-panel. Only the participation in an annual core study is mandatory. The participation in all other monthly surveys is voluntary.

¹¹ Due to experiences from earlier studies on family and fertility, the organizers of the LISS-Panel are aware that this is a sensitive topic for a couple of members in the panel population. In order to reduce panel attrition, all respondents could decide at the beginning of the module on reproductive preferences whether they like to answer the subsequent questions or not.

TABLE 2:
NUMBER OF CASES

August 2010	September 2010
① COOMBS n = 1,518 (60.9%) <i>n = 1,327 (61.1%)</i>	③ COOMBS n = 440 (20.2%)
	④ MODIFIED COOMBS n = 442 (20.3%)
	⑤ TERHUNE & KAUFMANN n = 445 (20.5%)
② TERHUNE & KAUFMANN n = 976 (39.1%) <i>n = 846 (38.9%)</i>	⑥ TERHUNE & KAUFMANN n = 396 (18.2%)
	⑦ COOMBS n = 450 (20.7%)

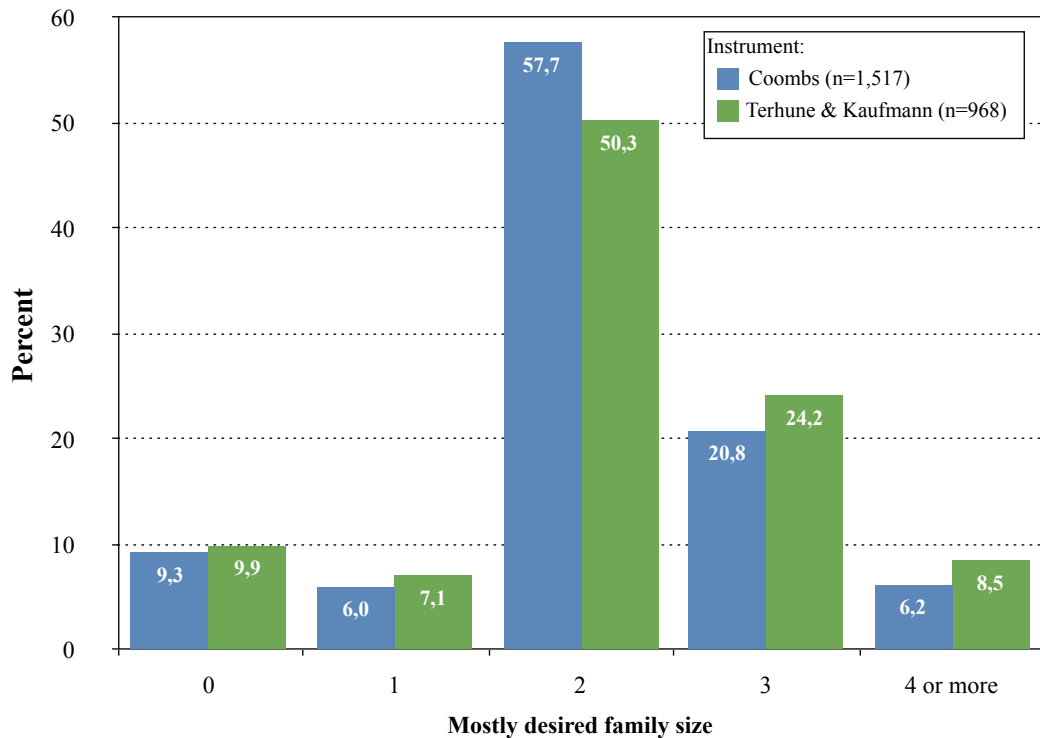
Note: Numbers in italics in the first column are related to the number of participants in the second wave.

In September 2010, all participants of the first wave were contacted again. From this population, 84.1% (2,173 individuals) participated in the second wave. Again, a small share of respondents (3,6%, 78 cases) rejected to reply to answers about family and children. Therefore, the second wave provides panel data for 2,095 individuals, which makes 52.1% of the LISS-participants at childbearing age who were contacted in August 2010.

5. Results

The presentation of the results is structured according to the research questions addressed in Section 3. The analyses firstly concentrate on the amount and heterogeneity of information provided by the instruments by Coombs and Terhune and Kaufmann. They compare the instruments' distributions of ideal family sizes and alternative reproductive goals, as well as patterns of fertility-related preference orders. Thereafter, the analyses address specificities of the two instruments: whether the instrument by Coombs forces uncertain respondents to name an ideal family size and whether respondents' answers tend to be influenced by social desirability. According to the instrument by Terhune and Kaufmann, results on inconsistent preference orders and the presence of placement effects are reported. Finally, the reliability of both instruments is tested by test-retest and parallel-test designs. The analyses are both bivariate and multivariate. Multivariate analyses are performed in order to explore whether the two instruments lead to different answers even if one controls for basic characteristics of the respondents that may have an influence on their reproductive desires. The control variables are gender, age, number of children born, level of education, income, area of living, marital status, and employment situation.

FIGURE 2:
DISTRIBUTION OF THE MOSTLY DESIRED FAMILY SIZE BY KIND OF INSTRUMENT
(1ST WAVE)



5.1. Amount and heterogeneity of the data

THE IDEAL NUMBER OF CHILDREN

In a first step, the distributions of ideal family size generated by the instruments by Coombs and Terhune and Kaufmann are compared. Figure 2 documents the results for the first wave. There is clear evidence by both instruments that the majority of respondents prefers to have two children. 57.7% resp. 50.3% preferred this size of a family in the instruments by Coombs resp. Terhune and Kaufmann. The second most often reported number is three children (20.8% resp. 24.2%) followed by a preference for being childless (9.3% resp. 9.9%).¹² Although these variations are not large, both distributions differ significantly ($\chi^2 = 14.567$, $df = 4$), which is primarily caused by the fact that the distribution generated by the Coombs instrument is more peaked towards an ideal family size of two children and that the distribution created by the instrument by Terhune and Kaufmann is more heterogeneous.

The difference of the two instruments according to an ideal family size of two children is also confirmed by multivariate analysis (see Table 3). There is a significantly higher chance in the instrument by Coombs to name two children as a first preference as in the instrument by Terhune and Kaufmann.

¹² Although the population of respondents is not representative for the Netherlands, the results are comparable to other studies. For example, Goldstein *et al.* (2003, Figure 2) report a share of 53% of respondents preferring to have two children, but they also document a share of around 18 per cent preferring childlessness. See also Hin *et al.* (2011) for a more detailed comparison of the results with other Dutch data.

TABLE 3
EFFECTS OF THE INSTRUMENT BY COOMBS ON RESPONDENTS' MOSTLY PREFERRED FAMILY SIZE
(1ST WAVE, MULTINOMIAL LOGIT)

	Mostly preferred family size				
	0	1	2	3	4 or more
Instrument by Coombs ^a	1.098 (0.732)	Ref.	1.547* (0.350)	0.998 (0.247)	1.075 (0.322)
Log likelihood	-1,678.067				
χ^2 (df)	606.13 (64)***				
N	1,577				

Notes: The model controls for gender, age, number of children born, level of education, income, area of living, marital status, and employment situation.

^a Reference category: instrument by Terhune and Kaufmann

Levels of significance: * ≤ 0.1 ; ** ≤ 0.05 ; *** ≤ 0.01 .

FAMILY SIZES NAMED AS SECOND, THIRD, AND FOURTH PREFERENCE

Table 4 reports the distributions of family sizes that were named as second, third, and fourth alternative. In order to compare the results of the two instruments, one has to consider for the instrument by Coombs, that at each step all respondents were excluded from subsequent questions, who have decided for childlessness or for having four or more children. Thus, the results of the two instruments cannot directly be compared. Consequently, the results of the instrument by Terhune and Kaufmann are presented both for all respondents and for all respondents who did not name childlessness or four or more children at the first, second, or third preference level (see also notes in Table 4). The latter group 'simulates' to some extent the logic of the instrument by Coombs by excluding respondents who have reached the upper or lower limit of the range of possible family sizes. By ruling out these respondents, an increasing share of cases is not considered at subsequent preference levels. In the instrument by Coombs, 1,517 respondents answered the questions about their ideal family size, but only 728 respondents (48.0%) were able to report their fourth reproductive choice. In the case of the instrument by Terhune and Kaufmann, however, no cases get lost, but if one would follow the logic of the instrument by Coombs, the number of respondents with a preference order of four levels would decline from 968 to 412 cases (42.6%).

According to the number of children that are perceived as a second-best alternative, the instrument by Coombs shows a two-peaked distribution. 36.9% of the respondents prefer to have three children, 31.4% evaluate one child as a second preference. These two peaks are very much the outcome of the instrument's path-dependent character.¹³ All respondents who have named two children as their ideal family size had to decide between one child or three children as their second-best alternative. In the case

¹³ Due to the path-dependent character, no multivariate analyses for alternative family sizes are carried out. Significant differences between the instruments would primarily reflect their different designs, but not different patterns of answers by the respondents.

TABLE 4:
DISTRIBUTIONS OF FAMILY SIZE NAMED AS 2ND, 3RD, 4TH, AND 5TH PREFERENCE
BY KIND OF INSTRUMENT
(1ST WAVE)

	Preference									
	2 nd			3 rd			4 th		5 th	
	Coombs	Terhune & Kaufmann		Coombs	Terhune & Kaufmann		Coombs	Terhune & Kaufmann	Terh. & Kaufm.	
	Reduced ^a	All		Reduced ^b	All		Reduced ^c	All	All	
0	3.1 (40)	2.8 (22)	2.3 (22)	30.3 (322)	14.8 (101)	10.6 (101)	61.7 (449)	44.9 (185)	21.4 (204)	55.7 (530)
1	31.4 (402)	25.8 (202)	27.9 (268)	30.8 (327)	37.4 (256)	29.1 (277)	--	--	33.4 (318)	2.5 (24)
2	21.2 (272)	29.2 (229)	26.8 (258)	--	0.1 (1)	22.7 (216)	--	--	0.2 (2)	0.2 (2)
3	36.9 (473)	33.4 (262)	35.6 (342)	25.1 (266)	22.7 (155)	19.6 (187)	--	--	20.4 (194)	0.3 (3)
4 or more	7.4 (95)	8.8 (69)	7.5 (72)	13.8 (146)	25.0 (171)	18.0 (171)	38.3 (279)	55.1 (227)	24.6 (234)	41.3 (393)
χ^2 (df)	21.017*** (4)			78.565*** (4)			29.985*** (1)			
N	1,282	784	962	1,061	684	952	728	412	952	952

^a Only respondents considered who have named one to three children as their first preference.

^b Only respondents considered who have named one to three children as their first and second preference.

^c Only respondents considered who have named one to three children as their first, second, and third preference.

Levels of significance: * ≤ 0.1 ; ** ≤ 0.05 ; *** ≤ 0.01 .

of the instrument by Terhune and Kaufmann, the majority of respondents also prefers three children, but the shares of respondents who evaluate one child or two children as a second-best reproductive aim is much more equally distributed compared to the instrument by Coombs.

According to the numbers of children named as third or fourth preference, the distributions provided by the two instruments become increasingly different. In the instrument by Coombs, around 30% of the respondents attributed either childlessness or one child as their third-best reproductive aim. Due to the instrument's design, no respondent could name two children as his or her third reproductive preference.¹⁴ In the instrument by Terhune and Kaufmann, however, this size of a family was repeatedly named. Most respondents prefer to have one child (29,1%) followed by a preference for having two children (22,7%). According to the number of children named as fourth preference, the respondents who replied to the instrument by Coombs could only decide between childlessness or four or more children. 61.7% decided for childlessness. The results by the instrument of Terhune and Kaufmann provide a different picture. One-third of the respondents (33.4%) named one child followed by the preference to have four or more children (24.6%).

The last column in Table 5 reports the distribution of family sizes that were least desired by the respondents of the instrument by Terhune and Kaufmann. Most inter-

¹⁴ Among all respondents who had to reply to the instruments by Coombs in the first wave, 75,6% named two children as their first or second preference. The remaining 24.4% had already reached the instrument's upper or lower limits of four or more children or of childlessness.

TABLE 5:
THE FIVE PREFERENCE ORDERS OF FAMILY SIZE MOST OFTEN NAMED
BY KIND OF INSTRUMENT
(1ST WAVE)

Coombs					Terhune & Kaufmann				
Preferences				Percent (n)	Preferences				Percent (n)
1 st	2 nd	3 rd	4 th		1 st	2 nd	3 rd	4 th	
2	3	1	4	16.7 (194)	2	3	1	4	11.0 (105)
2	1	3	0	14.8 (172)	3	2	4	1	9.6 (91)
2	1	0	--	13.0 (151)	2	3	1	0	8.2 (78)
2	3	4	--	12.6 (146)	4	3	2	1	7.7 (73)
2	3	1	0	11.4 (133)	2	1	3	0	7.5 (71)

viewees named childlessness or four or more children at the lowest level of their preference orders. Due to reasons of comparison – the instrument by Coombs can only cover hierarchies of four levels – the subsequent analyses will not consider the fifth preference in the instrument by Terhune and Kaufmann.

PATTERNS OF PREFERENCE ORDERS

Looking at the number of children most often named at each level of preference, the instrument by Coombs provides an order of 2-3-1-0 children and the instrument by Terhune and Kaufmann reports an order of 2-3-1-1. Thus, in both populations a larger family with three children is named as second preference followed by a smaller family with one child as third preference. However, there is also a strong preference for a smaller family in general. In the instruments by Coombs resp. Terhune and Kaufmann 31.4% resp. 27.9% named one child as the second best reproductive aim.

Can these patterns found on an aggregated level also be identified on the individual one? Table 5 documents the five most often reported hierarchies of reproductive aims. In both instruments, the order 2-3-1-4 was most often named (Coombs: 16.7%, Terhune & Kaufmann: 11.0%). Looking only at the first three preferences, 28.1% (Coombs) resp. 19.2% (Terhune and Kaufmann) of the respondents named two children, three children and one child as their first, second, and third preference. Moreover, many respondents reported hierarchies that do not indicate a consistent desire towards a larger or smaller family. Among the five most often named patterns of reproductive orders, only in the case of the instrument by Coombs 13.0% report a consistent preference for having a larger family (2-3-4) followed by 12.6% who consistently prefer to have a smaller family (2-1-0). In the instrument by Terhune and Kaufmann, only the preference order 4-3-2-1 is among the five most often named hierarchies.

TABLE 6A:
ORDERS OF PREFERRED FAMILY SIZE BY KIND OF INSTRUMENT
ALL RESPONDENTS WITH AN IDEAL FAMILY SIZE OF HAVING NO CHILDREN
(WAVE 1)

	Coombs			Terhune & Kaufmann		
	n	% all	% 1 st	n	% all	% 1 st
<i>Consistent increase of preferred family size</i>						
2 nd preference: one child (0-1-X-X)	-- ^a	--	--	65	6.7	67.7
3 rd preference: two children (0-1-2-X)	-- ^a	--	--	65	6.7	67.7
4 th preference: three children (0-1-2-3)	-- ^a	--	--	63	6.5	65.6
4 th preference: four children (0-1-2-4)	-- ^a	--	--	1	0.1	1.0
3 rd preference: three children (0-1-3-X)	-- ^a	--	--	1	0.1	1.0
4 th preference: four children (0-1-3-4)	-- ^a	--	--	1	6.7	67.7
2 nd preference: two children (0-2-X-X)	-- ^a	--	--	25	2.6	26.0
3 rd preference: three children (0-2-3-X)	-- ^a	--	--	12	1.2	12.5
4 th preference: four children (0-2-3-4)	-- ^a	--	--	2	0.2	2.1
2 nd preference: three children (0-3-X-X)	-- ^a	--	--	3	0.3	3.1
3 rd preference: four children (0-3-4-X)	-- ^a	--	--	-- ^b	--	--
2 nd preference: four children (0-4-X-X)	-- ^a	--	--	3	0.3	3.1
<i>Inconsistent orders of preferred family size</i>						
2 nd preference: two children						
3 rd preference: one child (0-2-1-X)	-- ^a	--	--	13	1.3	13.5
2 nd preference: four children						
3 rd preference: one child (0-4-1-X)	-- ^a	--	--	1	0.1	1.0
3 rd preference: two children (0-4-2-X)	-- ^a	--	--	1	0.1	1.0
3 rd preference: three children (0-4-3-X)	-- ^a	--	--	1	0.1	1.0
<i>Total share of consistent preference orders</i>						
Increase until 3 rd preference	-- ^a	--	--	77	8.0	80.2
Increase until 4 th preference	-- ^a	--	--	67	6.9	69.8

Notes: The percentages reported in the column headed ‘% all’ are related to all respondents who replied to the particular instrument. The percentages in the column headed ‘% 1st’ are related to all respondents who replied to the particular instrument and named the particular ideal family size. The expression ‘-X’ in the first column means that any or no family size is possible. For example, the expression ‘0-1-X-X’ covers the combinations ‘0-1-2-3’, ‘0-1-2-4’, and ‘0-1-3-4’.

^a Combination not possible in the instrument by Coombs, due to exclusion of respondents at the first, second, or third level.

^b Combination not named.

Tables 6a to 6e take closer looks at these orders. Separated by the ideal family sizes named, the tables report frequencies of particular combinations of preferences orders. These combinations are organized according to their general character: whether respondents reported orders that move towards smaller family sizes (consistent decrease), move towards larger family sizes (consistent increase), do not show a clear trend towards a smaller or larger family (inconsistent order), or revolve around the mostly desired number of children (revolving around first preference). Orders, moreover, are separated by their lengths, i.e. whether the respondent reported a consistent hierarchy towards a smaller or larger family within the first two, three, or all four levels or whether

TABLE 6B:
ORDERS OF PREFERRED FAMILY SIZE BY KIND OF INSTRUMENT
ALL RESPONDENTS WITH AN IDEAL FAMILY SIZE OF ONE CHILD
(WAVE 1)

	Coombs			Terhune & Kaufmann		
	n	% all	% 1 st	n	% all	% 1 st
<i>Consistent increase of preferred family size</i>						
2 nd preference: two children (1-2-X-X)	51	3.4	56.0	54	5.6	80.6
3 rd preference: three children (1-2-3-X)	15	1.0	16.5	16	1.7	23.9
4 th preference: four children (1-2-3-4)	6	0.4	6.6	16	1.7	23.9
3 rd preference: four children (1-2-4-X)	-- ^a	--	--	-- ^b	--	--
2 nd preference: three children (1-3-X-X)	-- ^a	--	--	-- ^b	--	--
2 nd preference: four children (1-4-X-X)	-- ^a	--	--	-- ^b	--	--
<i>Consistent decrease of preferred family size</i>						
2 nd preference: no child (1-0-X-X)	40	2.6	44.0	13	1.3	19.4
<i>Inconsistent orders of preferred family size</i>						
2 nd preference: two children						
3 rd preference: no child (1-2-0-X)	36	2.4	40.0	30	3.1	44.7
2 nd preference: no child						
3 rd preference: two children (1-0-2-X)	-- ^a	--	--	12	1.2	17.9
3 rd preference: three children (1-0-3-X)	-- ^a	--	--	1	0.1	1.5
3 rd preference: three children (1-0-4-X)	-- ^a	--	--	1	0.1	1.5
2 nd preference: three children						
3 rd preference: no child (1-3-0-X)	-- ^a	--	--	-- ^b	--	--
3 rd preference: two children (1-3-2-X)	-- ^a	--	--	-- ^b	--	--
2 nd preference: four children						
3 rd preference: no child (1-4-0-X)	-- ^a	--	--	-- ^b	--	--
3 rd preference: two children (1-4-2-X)	-- ^a	--	--	-- ^b	--	--
3 rd preference: three children (1-4-3-X)	-- ^a	--	--	-- ^b	--	--
<i>Total share of consistent preference orders</i>						
Increase until 3 rd preference	15	1.0	16.5	16	8.0	23.9
Increase until 4 th preference	6	0.4	6.6	16	6.9	23.9
<i>Share of preference orders revolving around 1st preference</i>						
2 nd preference: larger family size (1-2-0-X)	36	2.4	40.0	30	3.1	44.7
2 nd preference: smaller family size (1-0-2-X)	-- ^a	--	--	12	1.2	17.9

Notes: see Table 6a

he or she addressed an inconsistent order among the first three levels of preferences (see also the footnote in Table 6a).

Table 6a documents the orders of the respondents preferring childlessness. Most of the respondents of the instrument by Terhune and Kaufmann (65.6%) report a rank order of alternative reproductive goals that move step by step towards a larger family, i.e. they attribute one child, two, and finally three children as their second, third and fourth reproductive alternative. 26.0% decided for two children as second preference. However, only a small number of these respondents (2 cases) subsequently named a continuous increase of alternative family sizes (0-2-3-4).

TABLE 6C:
ORDERS OF PREFERRED FAMILY SIZE BY KIND OF INSTRUMENT
ALL RESPONDENTS WITH AN IDEAL FAMILY SIZE OF TWO CHILDREN
(WAVE 1)

	Coombs			Terhune & Kaufmann		
	n	% all	% 1 st	n	% all	% 1 st
<i>Consistent increase of preferred family size</i>						
2 nd preference: three children (2-3-X-X)	473	31.2	54.1	257	26.5	54.0
3 rd preference: four children (2-3-4-X)	146	9.6	16.7	70	7.2	14.7
2 nd preference: four children (2-4-X-X)	-- ^a	--	--	12	1.2	2.5
<i>Consistent decrease of preferred family size</i>						
2 nd preference: one child (2-1-X-X)	402	26.5	45.9	199	20.6	41.8
3 rd preference: two children (2-1-0-X)	151	10.0	17.3	64	6.6	13.4
2 nd preference: no child (2-0-X-X)	-- ^a	--	--	8		1.7
<i>Inconsistent orders of preferred family size</i>						
2 nd preference: three children						
3 rd preference: one child (2-3-1-X)	327	21.6	37.4	183	18.9	38.4
3 rd preference: no child (2-3-0-X)	-- ^a	--	--	4	0.4	0.8
2 nd preference: four children						
3 rd preference: three children (2-4-3-X)	-- ^a	--	--	10	1.0	2.1
3 rd preference: one child (2-4-1-X)	-- ^a	--	--	2	0.2	0.4
3 rd preference: no child (2-4-0-X)	-- ^a	--	--	-- ^b	--	--
2 nd preference: one child						
3 rd preference: three children (2-1-3-X)	251	16.5	28.7	131	13.5	27.5
3 rd preference: four children (2-1-4-X)	-- ^a	--	--	4	0.4	0.8
2 nd preference: no child						
3 rd preference: one children (2-0-1-X)	-- ^a	--	--	5	0.5	1.1
3 rd preference: three children (2-0-3-X)	-- ^a	--	--	3	0.3	0.6
3 rd preference: four children (2-0-4-X)	-- ^a	--	--	-- ^b	--	--
<i>Share of consistent preference orders</i>						
Increase until 3 rd preference	146	9.6	16.7	70	7.2	14.7
Decrease until 3 rd preference	151	10.0	17.3	64	6.6	13.4
<i>Share of preference orders revolving around 1st preference</i>						
2 nd preference: larger family size (2-3-1-X)	327	21.6	37.4	183	18.9	38.4
2 nd preference: smaller family size (2-1-3-X)	251	16.5	28.7	131	13.5	27.5

Notes: see Table 6a

Table 6b summarizes the results for all respondents who perceive one child as their ideal family size. The instruments both by Coombs and Terhune and Kaufmann document that the majority of these respondents prefer to have a larger family of two children (56.0% resp. 78.3%) as a second-best alternative, followed by the option of being childless (44.0% resp. 18.8%). Only a minority reported an order of continuously increasing numbers of children, as most chose childlessness as their third reproductive aim (87.4% resp. 55.6% of all respondents who named two children as their second-best desired family size). Therefore, a substantive share of inconsistent orders can be interpreted as 'revolving' around the mostly desired goal of having one child. This applies to

TABLE 6D:
ORDERS OF PREFERRED FAMILY SIZE BY KIND OF INSTRUMENT
ALL RESPONDENTS WITH AN IDEAL FAMILY SIZE OF THREE CHILDREN
(WAVE 1)

	Coombs			Terhune & Kaufmann		
	n	% all	% 1 st	n	% all	% 1 st
<i>Consistent increase of preferred family size</i>						
2 nd preference: three children (3-4-X-X)	95	6.3	30.1	57	5.9	24.4
<i>Consistent decrease of preferred family size</i>						
2 nd preference: two children (3-2-X-X)	221	14.6	69.9	173	17.9	73.9
3 rd preference: one child (3-2-1-X)	119	7.8	37.7	73	12.3	31.2
4 th preference: no child (3-2-1-0)	42	2.8	13.3	27	2.8	11.5
3 rd preference: no child (3-2-0-X)	-- ^a	--	--	3	0.3	1.3
2 nd preference: one child (3-1-X-X)	-- ^a	--	--	1	0.1	0.4
3 rd preference: no child (3-1-0-X)	-- ^a	--	--	-- ^b	--	--
2 nd preference: no child (3-0-X-X)	-- ^a	--	--	-- ^b	--	--
<i>Inconsistent orders of preferred family size</i>						
2 nd preference: four children						
3 rd preference: two children (3-4-2-X)	-- ^a	--	--	57	5.9	24.4
3 rd preference: one child (3-4-1-X)	-- ^a	--	--	-- ^b	--	--
3 rd preference: no child (3-4-0-X)	-- ^a	--	--	-- ^b	--	--
2 nd preference: two children						
3 rd preference: four children (3-2-4-X)	102	6.7	32.3	97	10.0	41.5
2 nd preference: one child						
3 rd preference: two children (3-1-2-X)	-- ^a	--	--	1	0.1	0.4
3 rd preference: four children (3-1-4-X)	-- ^a	--	--	-- ^b	--	--
2 nd preference: no child						
3 rd preference: two children (3-0-2-X)	-- ^a	--	--	-- ^b	--	--
3 rd preference: four children (3-0-4-X)	-- ^a	--	--	-- ^b	--	--
<i>Share of consistent preference orders</i>						
Decrease until 3 rd preference (3-2-1-X)	119	7.8	37.7	73	7.5	31.2
<i>Share of preference orders revolving around 1st preference</i>						
2 nd preference: larger family size (3-4-2-X)	-- ^a	--	--	57	5.9	31.2
2 nd preference: larger family size (3-2-4-X)	102	6.7	32.3	97	10.0	41.5

Notes: see Table 6a

40.0% of the respondents who answered the instrument by Coombs and to 62.6% of the respondents who were confronted with the instrument by Terhune and Kaufmann.¹⁵

The respondents who named two children as their mostly desired family size show similar patterns of reproductive orders as the respondents who ideally like to have one child. They more often prefer to have a larger family of three children (54.1% resp. 54.0%) than a smaller one with one child (45.9% resp. 41.8%). Relatively small shares of respondents show consistent hierarchies towards smaller or larger families. Among the respondents of the instrument by Coombs, 16.7% report an order of 2-3-4 children

¹⁵ However, the share of revolving preference orders has to be in general smaller in the instrument by Coombs, as it does not allow for an order of 1-0-2-X.

TABLE 6E:
ORDERS OF PREFERRED FAMILY SIZE BY KIND OF INSTRUMENT
ALL RESPONDENTS WITH AN IDEAL FAMILY SIZE OF FOUR OR MORE CHILDREN
(WAVE 1)

	Coombs			Terhune & Kaufmann		
	n	% all	% 1 st	n	% all	% 1 st
<i>Consistent decrease of preferred family size</i>						
2 nd preference: three children (4-3-X-X)	-- ^a	--	--	77	8.0	93.9
3 rd preference: two children (4-3-2-X)	-- ^a	--	--	77	8.0	93.9
4 th preference: one child (4-3-2-1)	-- ^a	--	--	73	7.5	89.0
3 rd preference: one child (4-3-1-X)	-- ^a	--	--	-- ^b	--	--
4 th preference: no child (4-3-1-0)	-- ^a	--	--	-- ^b	--	--
3 rd preference: no child (4-3-0-X)	-- ^a	--	--	-- ^b	--	--
<i>Inconsistent orders of preferred family size</i>						
2 nd preference: two children						
3 rd preference: three children (4-2-3-X)	-- ^a	--	--	4	0.4	4.9
2 nd preference: one children						
3 rd preference: two children (4-1-2-X)	-- ^a	--	--	1	0.1	1.2
3 rd preference: three children (4-1-3-X)	-- ^a	--	--	-- ^b	--	--
2 nd preference: no child						
3 rd preference: one children (4-0-1-X)	-- ^a	--	--	-- ^b	--	--
3 rd preference: two children (4-0-2-X)	-- ^a	--	--	-- ^b	--	--
3 rd preference: three children (4-0-3-X)	-- ^a	--	--	-- ^b	--	--
<i>Share of consistent preference orders</i>						
Decrease until 3 rd preference	-- ^a	--	--	77	8.0	93.9
Decrease until 4 th preference	-- ^a	--	--	73	7.5	89.0

Notes: see Table 6a

and 17.3% prefer a hierarchy of 2-1-0. The results by the instrument of Terhune and Kaufmann are similar with 14.7% for the order 2-3-4 and 13.4% for the order 2-1-0. Finally, high shares of respondents again ‘revolve’ around their mostly preferred family size by reporting orders of 2-3-1 or 2-1-3 children. This applies to 66.1% of the respondents to the instruments by Coombs and to 65.9% of the respondents of the instrument by Terhune and Kaufmann.

Among the respondents who like to have three children, only a minority (30.1% resp. 24.4%) prefers to have a larger family of four or more children as a second-best reproductive aim (see Table 6d). 69.9% and 73.9% chose a smaller family of two children. However, only around one-third (37.7% resp. 31.2%) of the respondents report an order of continuously declining family sizes until the third preference (3-2-1-X) and only 13.3% resp. 11.5% document a complete order of continuous decline (3-2-1-0). Again, many respondents revolve around their first choice of having three children. This applies to 32.3% of the respondents of the instrument by Coombs and to 72.7% of the respondents of the instrument by Terhune and Kaufmann.¹⁶

¹⁶ As the instrument by Coombs does not allow the sequence 3-4-2 the share of respondents revolving around their first choice is smaller.

TABLE 7
EFFECTS OF THE INSTRUMENT BY COOMBS ON PATTERNS OF PREFERENCE ORDERS
(PATTERN OF 1ST, 2ND, AND 3RD PREFERENCE; 1ST WAVE)

A) ALL RESPONDENTS (MULTINOMIAL LOGIT)				
	Pattern of preference order			
	Continuous increase	Continuous decrease	Revolving from high to low ^a	Revolving from low to high ^b
Instrument by Coombs	1.087 (0.232)	Ref.	1.010 (0.174)	0.927 (0.157)
Log likelihood	-1,500.858			
χ^2 (df)	71.51 (45)***			
N	1,160			
B) RESPONDENTS WITH ONE CHILD AS FIRST PREFERENCE (LOGIT)				
	Pattern of preference order			
	Continuous increase	Continuous decrease	Revolving from high to low ^a	Revolving from low to high ^b
Instrument by Coombs	0.832 (0.598)	-- ^c	Ref.	-- ^c
Log likelihood	-29.233			
χ^2 (df)	25.29 (13)**			
N	61			
C) RESPONDENTS WITH TWO CHILDREN AS FIRST PREFERENCE (MULTINOMIAL LOGIT)				
	Pattern of preference order			
	Continuous increase	Continuous decrease	Revolving from high to low ^a	Revolving from low to high ^b
Instrument by Coombs	1.151 (0.319)	Ref.	0.917 (0.208)	1.118 (0.263)
Log likelihood	-1,034.410			
χ^2 (df)	130.38(45)***			
N	840			
D) RESPONDENTS WITH THREE CHILDREN AS THIRD PREFERENCE (LOGIT)				
	Pattern of preference order			
	Continuous increase	Continuous decrease	Revolving from high to low ^a	Revolving from low to high ^b
Instrument by Coombs	-- ^c	1.652* (0.451)	-- ^c	Ref.
Log likelihood	-159.889			
χ^2 (df)	23.96 (16)*			
N	248			

Notes: All analyses control for gender, age, number of children born, level of education, income, area of living, marital status, and employment situation.

^a The family size preferred 2nd is larger than the mostly desired number of children, the family size preferred 3rd is smaller than the mostly preferred family size.

^b The family size preferred 2nd is smaller than the mostly desired number of children, the family size preferred 3rd is larger than the mostly preferred family size.

^c Preference order not possible.

Levels of significance: * ≤ 0.1 ; ** ≤ 0.05 ; *** ≤ 0.01 .

Table 6e documents the results for all respondents of the instrument by Terhune and Kaufmann with an ideal family size of four or more children. The majority report an order of continuously declining numbers of children until the third preference (93.9%) or until the fourth preference (89.0%).

Table 7, finally, reports results from multivariate analyses about the effect of the instrument by Coombs on the patterns of reproductive preferences named. The analyses concentrate on the orders of the first, second, and third preference levels.¹⁷ The results clearly document that the instrument by Coombs leads to hardly any significantly different patterns compared to the instrument by Terhune and Kaufmann. The only exception form respondents with a first preference for three children. Here, the interviewees who replied to the instrument by Coombs had a significantly higher chance to report a continuously decreasing preference order.

In comparing the patterns of preference orders in general, one has to conclude that the two instruments generate similar as well as dissimilar hierarchies. The results differ for respondents with an ideal family size of one child. Individuals who replied to the instrument by Terhune and Kaufman name more often a larger family of two children compared to respondents of the instrument by Coombs. The latter group also less often reported an order of continuously increasing numbers of children. However, if respondents chose two children as their ideal family size, both instruments tend to produce similar patterns according to the shares of consistent and revolving preference orders. In the case of an ideal family size of three children, the results differ again. For both instruments, a similar share of respondents reported continuously decreasing numbers of children, but the instrument of Terhune and Kaufmann generated a much larger share of preference orders revolving around the first preference.

Although the instrument by Coombs does not address all possible combinations of family sizes it covers most of the combinations that are relevant. The majority of respondents who replied to the instrument by Terhune and Kaufmann report combinations of reproductive aims that are addressed in the instrument by Coombs. Either their preference orders move up or down child by child or they revolve around the first preference. Hardly any respondent reported an order with large jumps up and down the hierarchy, like, for example, 0-3-1-4.

According to the heterogeneity of preference orders, the instrument by Terhune and Kaufmann generated a number of different preference orders, which equals to 38.3% of all preference orders possible (46 hierarchies out of 120 possible hierarchies). The five preference orders most often named make a share of 46.0% of all preference

¹⁷ As the instrument by Coombs ends if a preference for childlessness or for four or more children is named, the analyses do not consider respondents who named these family sizes as their first or second preference. Consequently, no analyses can be made for respondents who named childlessness or four or more children as their first preference and for the respondents who named one child or three children as first preference, only logistic regressions can be estimated.

orders reported. The instrument by Coombs covers in principle 14 different hierarchies with a length of two, three, or four levels. All 14 hierarchies were reported by the respondents. However, the five preference orders that were most often named make a share 68.5% of all hierarchies possible. Thus, the instrument by Terhune and Kaufmann creates a larger heterogeneity of preference orders and avoids coincidentally reports of unrealistic hierarchies of reproductive goals.

In the instrument by Coombs, the exclusion of respondents who reach the upper or lower border of possible family size has a coercive effect. (1) No information about alternative reproductive aims can be collected from respondents who attribute childlessness or four or more children as their mostly desired family size. (2) Orders of reproductive aims that revolve around respondents' first preferences of having one child or three children are not covered, because the instrument does not allow orders of 1-0-2-X or 3-4-2-X.

5.2. *Specificities of the instruments*

This section addresses some of the instruments' specificities and analyses how much these influence the reported orders of desired reproductive aims. As already discussed in Section 3, the instrument by Coombs may create artificial results, because also undecided or uncertain respondents are forced to name an ideal family size and a hierarchy of desired numbers of children. Moreover, the direct question on ideal family size may be prone to forces of social desirability. According to the instrument by Terhune and Kaufmann, its repetitive character may lead to mechanically given answers without a serious evaluation of the different reproductive aims offered to the respondents.

THE INSTRUMENT BY COOMBS

The possibility of a biasing influence due to the compelling character of the instrument by Coombs is addressed in two different ways. The first set of analyses explores to what extent the instrument forces undecided or uncertain respondents to report unrealistic reproductive hierarchies. In the second wave of the survey, one-third of the respondents who answered the instrument by Coombs in the first wave replied to a slightly modified Coombs-instrument (group 4 in Table 1). The only modification was that the question about the mostly desired family size was extended by two answer categories: that one has "not thought about it up to now" or that one has "no idea" about it. The number of respondents who marked one of these two categories provides information about the amount of forced hierarchies in the first wave. Additionally, the answers of the respondents who replied to the instrument by Coombs in the first wave and to the instrument by Terhune and Kaufmann in the second wave are analyzed (group 5 in Table 1). As the latter instrument allows for tied rankings that indicate an unclear preference order, it also provides information about forced hierarchies in the instrument by Coombs.

TABLE 8:
TIED RANKINGS IN THE INSTRUMENT BY TERHUNE AND KAUFMANN
(1ST AND 2ND WAVE)

Number of tied rankings	1 st wave		
	Terhune & Kaufmann	Coombs	
	②	2 nd wave	
		Terhune & Kaufmann	Terhune & Kaufmann
⑦	⑤		
None	97.5 (952)	97.1 (367)	96.5 (411)
1	--	--	--
2	0.2 (2)	0.3 (1)	0.2 (1)
3	2.3 (22)	2.6 (10)	3.3 (14)
4	--	--	--
Total	100.0 (976)	100.0 (378)	100.0 (426)

Note: The encircled numbers in cell titles indicate the cells in Table 1.

Only a very small fraction of respondents marked one of the two additional answer categories in the modified Coombs-instrument. 0.9% (4 cases) replied that they had not thought about an ideal family size up to now and 4.2% (19 cases) answered that they have no idea about their desired number of children. Thus, the instrument by Coombs does not seem to force a high share of respondents to report an unrealistic ideal family size. However, this interpretation can only be made with limitations. First, these answer categories were presented to the respondents in the second wave. Thus, there may be learning effects from the first wave, where also undecided or uncertain respondents had to report a preference order. These respondents may simply remember the answer they have given in the first wave. Second, in order to reduce panel attrition, respondents could state at the beginning of the questionnaire that they do not want to be interviewed about the topic. This applies to 3.2% (14 respondents) of the respondents who were selected for the modified instrument by Coombs. Although the reasons for these rejections are not known, one may speculate that also undecided or uncertain respondents may have used this exit option.

Table 8 documents the shares of respondents who reported tied rankings in the instrument by Terhune and Kaufmann. In general, only a small number prefers at least two different numbers of children equally often. This applies to 2.5% of the respondents in the first wave and to 2.9% resp. 3.5% of the respondents in the second wave. As the latter group covers all individuals who have replied to the instrument by Coombs in the first wave, the share of 3.5% gives a rough estimate about the number of uncertain or undecided individuals who may be forced by the Coombs-instrument to report a hierarchy of reproductive goals.

In general, however, all these results report a relatively low share of undecided or uncertain respondents. Thus, the compelling character of the instrument by Coombs may probably force around ten percent of the respondents to report orders of reproduc-

TABLE 9:
MOSTLY DESIRED FAMILY SIZE BY KIND OF INSTRUMENT AND WAVE
(PANEL POPULATION)

	1 st wave									
	① Coombs					② Terhune & Kaufmann				
	2 nd wave									
	③ Coombs		④ Modified Coombs		⑤ Terhune & Kaufmann		⑥ Coombs		⑦ Terhune & Kaufmann	
	Wave	Wave	Wave	Wave	Wave	Wave	Wave	Wave	Wave	Wave
	1	2	1	2	1	2	1	2	1	2
0	10.0	10.7	8.0	7.5	9.8	10.0	9.3	9.8	10.9	9.5
1	5.4	5.6	7.0	7.8	6.1	7.8	7.1	6.0	5.6	7.8
2	59.5	59.5	58.8	58.8	54.7	52.8	51.0	53.6	50.7	51.5
3	20.2	18.5	20.1	18.1	22.1	21.7	23.8	23.1	23.5	22.7
4 or more	4.9	5.6	6.0	7.8	7.3	7.8	8.8	7.6	9.2	8.4
Total	100.0	99.9	99.9	100.0	100.0	99.9	100.0	100.1	99.9	99.9
χ^2 (df = 4)	0.646		1.530		1.100		1.190		0.190	
N	410	410	398	398	411	411	420	420	357	357

Note: The encircled numbers in the cell titles indicate the cells in Table 1.

tive aims they do not have. In the case of large surveys, however, also ten percent may lead to a seriously biasing effect.

Forces of social desirability are present in an interview situation when respondents expect social disapproval, because they think that their correct answers to a particular question would significantly deviate from a subjectively perceived social standard (Tourangeau and Yan, 2007: 860, Holtgraves 2004). Consequently, they adjust their answers to this standard. Identifying social desirability in survey questions is a complex task, which needs additional information about the respondents. These analyses would go beyond the scope of this paper. Therefore, the subsequent analysis will only concentrate on the question, whether there is some evidence about the possible presence of social desirability in the instrument by Coombs.

Similar to other European societies, two children make a size of a family that is commonly accepted and socially desired in the Dutch society. Thus, if forces of social desirability are more present in the instrument by Coombs than in the instrument by Terhune and Kaufmann, the socially ideal family size of two children should be more often named in the first instrument.

According to the instruments' distribution of ideal family size in the two waves, the instrument by Coombs always leads to higher shares of two children than the instrument by Terhune and Kaufmann. The shares in the first wave are 57.7% for the Coombs-instrument and 50.3% for the instrument by Terhune and Kaufmann (see Figure 2). In the second wave they have the amount of 56.3% resp. 51.9%. However, the results of the second wave may be influenced by possible learning effects from the first wave.

TABLE 10
EFFECTS OF SURVEY INSTRUMENTS ON RESPONDENTS' MOSTLY PREFERRED FAMILY SIZE
(PANEL POPULATION)

A) INSTRUMENTS USED IN THE 2ND WAVE (MULTINOMIAL LOGIT)

	Preference order				
	0	1	2	3	4 or more
Instrument by Coombs (unmodified and modified)	Ref.	0.971 (0.274)	1.286 (0.285)	0.998 (0.251)	1.236 (0.376)
Log likelihood		-1,459.981			
χ^2 (df)		517.37 (64)***			
N		1,341			

B) COMBINATIONS OF INSTRUMENTS USED IN THE 1ST AND 2ND WAVE (MULTINOMIAL LOGIT)

	Preference order				
	0	1	2	3	4 or more
<i>1st wave: Coombs</i>					
2 nd wave: Coombs (modified and unmodified)	Ref.	1.141 (0.461)	1.343 (0.410)	0.899 (0.313)	1.220 (0.508)
2 nd wave: Terhune and Kaufmann	Ref.	1.337 (0.580)	0.877 (0.298)	0.938 (0.359)	0.838 (0.393)
<i>1st wave: Terhune & Kaufmann</i>					
2 nd wave: Coombs	Ref.	1.180 (0.526)	1.070 (0.365)	1.149 (0.439)	1.073 (0.499)
2 nd wave: Terhune and Kaufmann	Ref.	Ref.	Ref.	Ref.	Ref.
Log likelihood		-1,457.815			
χ^2 (df)		521.70 (72)***			
N		1,341			

Notes: All analyses control for gender, age, number of children born, level of education, income, area of living, marital status, and employment situation.

Levels of significance: * ≤ 0.1 ; ** ≤ 0.05 ; *** ≤ 0.01 .

Therefore, Table 9 reports the distributions of the ideal family size for all combinations of instruments in the two waves. According to the results, the modified respective unmodified version of the instrument by Coombs generate the highest shares of respondents with an ideal family size of two children (59.9% resp. 58.8%), but the group of respondents who replied to the instrument by Terhune and Kaufmann twice reports the lowest share (51.5%). Moreover, the share of an ideal family size of two children decreases for respondents who answered to the instrument by Coombs in the first wave (54.7%) and to the instrument by Terhune and Kaufmann in the second wave (52.8%). It increases, however, for respondents who replied to the two instruments in the reverse order (first wave: 51.0%, second wave: 53.6%). Thus, there is some tendency of the instrument by Coombs to generate higher shares of an ideal family size with two children. However, this tendency does not lead to strong differences.

This conclusion is also supported by multivariate analyses. According to Table 10a, respondents who replied to the unmodified or modified version of the instrument by Coombs had a higher chance to name an ideal family size of two children, but this effect is not significant. This holds also for the positive effect of stating an ideal number of children of four or more. The analyses considering the combinations of instruments in the first and second wave also show only tendencies, but no significant results. Respondents who replied to the instrument by Coombs in both waves named an ideal family size of two children with a higher probability than respondents who were confronted twice with the instrument by Terhune and Kaufmann. Moreover, this size of a family was reported with a lower probability by respondents who replied to the instrument by Coombs in the first wave and to the instrument by Terhune and Kaufmann in the second wave.

THE INSTRUMENT BY TERHUNE AND KAUFMANN

In the case of the instrument by Terhune and Kaufmann, its repetitive character may have a biasing effect on the reported orders of reproductive goals. Respondents have to reply to series of similar questions that only differ by the two numbers of children addressed. This may lead to mechanically given answers. The presence of this situation can indirectly be analyzed by placement effects. A placement effect is present, if an answer category is chosen not because of its content, but because of its position in the list of possible answers. In the case of repeated pairwise comparisons, a placement effect is present, if the first or the second alternative is more often chosen, irrespective of its content.

In order to explore this bias, respondents of the instrument by Terhune and Kaufmann were randomly divided in two groups. In the first group, the larger family

TABLE 11:
PREFERRED NUMBER OF CHILDREN IN THE INSTRUMENT BY TERHUNE AND KAUFMANN
BY PREFERENCE ORDER AND QUESTION DESIGN
(1ST WAVE)

	Preference							
	1 st		2 nd		3 rd		4 th	
	Question design		Question design		Question design		Question design	
Number of children	Smaller size first	Larger size first	Smaller size first	Larger size first	Smaller size first	Larger size first	Smaller size first	Larger size first
0	10.6	9.2	1.5	3.1	11.6	9.6	22.4	20.5
1	6.9	7.4	30.1	25.7	33.0	25.3	28.5	38.2
2	51.8	48.9	27.3	26.3	20.7	24.6	--	0.4
3	23.4	24.9	35.3	35.8	19.2	20.0	21.8	19.0
4	7.3	9.6	5.8	9.1	15.4	20.5	27.3	21.9
Total	100.0	100.0	100.0	100.0	99.9	100.0	100.0	100.0
χ^2 (df = 4)	2.752		8.049 *		10.827 **		12.762 **	
N	479	489	479	483	473	479	473	479

Levels of significance: * ≤ 0.1 ; ** ≤ 0.05 ; *** ≤ 0.01 .

size was always shown as the first alternative. In the second group, the first alternative presented was always the smaller number of children. Thus, if there is a placement effect, the first group of respondents should always report larger family sizes compared to the second group.

The results documented in Table 11 tend to support this hypothesis. In the case of the mostly desired number of children, there are slight differences between the two groups, but these differences are not significant. According to family sizes ranked second and third, a clearer pattern can be observed. Here, presenting the smaller number of children first leads to higher shares of one child families or childlessness. The distributions of the numbers of children ranked fourth show an opposite picture. However, this is an outcome of the limited pool of possible family sizes. If smaller family sizes are more often named among the first three preferences, larger families are automatically more often named as fourth preference.

The fact that respondents are especially sensitive to placement effects among the family sizes they prefer second and third can be interpreted in two directions. First, it addresses a methodological problem of the instrument by Terhune and Kaufmann and leads to the recommendation that the orders of alternative numbers of children presented to the respondents have to be randomly mixed. Second, it can also be interpreted as an indicator of uncertainty. Individuals may have a relative clear idea about their mostly preferred family size. Consequently, their decisions are not significantly biased by a placement effect. However, they may have less pronounced preferences according to their alternative reproductive aims or they may be less interested in making decisions about family sizes that are not relevant to them.

5.3. *Reliability*

The survey's design provides the opportunity to analyze the instruments' reliabilities in two different ways. For all respondents who answered the instruments by Coombs or by Terhune and Kaufmann twice, a test-retest analysis can be carried out (groups 3 and 6 in Table 1). As the modified instrument by Coombs in the second wave differs only because of two additional answer categories from the unmodified one, this group (group 3 in Table 1) of respondents can also be used for a test-retest analysis. Finally, for all respondents who replied to a different instrument in the second wave, a parallel-test is possible (groups 5 and 7 in Table 1). Subsequently, only the results of basic reliability analyses are reported: shares of respondents who reported an identical family size in both waves or who reported a higher or lower number of children, and Kappa as a measurement of the amount of identical answers in the two waves. Finally, results from multivariate analyses on the instruments' effects on respondents' chances to name an identical, smaller, or larger family size are discussed.

TABLE 12:
CONTINUOUITY AND CHANGE OF DESIRED FAMILY SIZE BY KIND OF RELIABILITY-TEST AND
LEVEL OF PREFERENCE
(PANEL POPULATION)

	Test-retest			Parallel-test	
	1 st wave			1 st wave	
	Coombs		Terhune & Kaufmann	Coombs	Terhune & Kaufmann
	2 nd wave			2 nd wave	
	Coombs ③	Modified Coombs ④	Terhune & Kaufmann ⑦	Terhune & Kaufmann ⑤	Coombs ⑥
<i>Change of 1st preference</i>					
Smaller family	8.0 (33)	5.3 (21)	7.3 (26)	10.0 (41)	9.0 (38)
No change	85.4 (355)	88.2 (351)	83.2 (297)	77.9 (320)	80.5 (338)
Larger family	6.6 (27)	6.5 (26)	9.5 (34)	12.2 (50)	10.5 (44)
Kappa	0.753***	0.804***	0.746***	0.656***	0.701***
N	410	398	357	411	420
<i>Change of 2nd preference</i>					
Smaller family	13.5 (45)	12.2 (42)	17.6 (62)	21.4 (72)	15.9 (55)
No change	75.4 (251)	72.2 (249)	64.8 (228)	62.2 (209)	68.7 (237)
Larger family	11.1 (37)	15.7 (54)	17.6 (62)	16.4 (55)	15.4 (53)
Kappa	0.649***	0.614***	0.511***	0.475***	0.565***
N	333	345	352	336	345
<i>Change of 3rd preference</i>					
Smaller family	11.6 (34)	18.9 (57)	21.1 (74)	25.8 (77)	19.9 (60)
No change	69.5 (203)	61.8 (186)	59.7 (209)	50.0 (149)	61.1 (184)
Larger family	18.8 (55)	19.3 (58)	19.1 (67)	24.2 (72)	18.9 (57)
Kappa	0.568***	0.480***	0.485***	0.307***	0.468***
N	292	301	350	298	301
<i>Change of 4th preference</i>					
Smaller family	10.2 (17)	11.6 (17)	14.9 (52)	24.5 (49)	25.3 (49)
No change	79.5 (132)	77.4 (113)	68.9 (241)	53.0 (106)	57.7 (112)
Larger family	10.2 (17)	11.0 (16)	16.3 (57)	22.5 (45)	17.0 (33)
Kappa	0.590***	0.548***	0.581***	0.267***	0.295***
N	166	146	350	200	194

Note: The encircled numbers in cell titles indicate the cells in Table 1.
Levels of significance: * ≤ 0.1 ; ** ≤ 0.05 ; *** ≤ 0.01 .

Table 12 documents descriptive results of reliability for the first four preference levels of desired family size. The test-retest analysis for the ideal number of children shows high levels of reliability. Among the respondents who replied to the instrument by

Coombs twice, 85.4% named the same family size in both waves. Among the respondents who replied to the modified instrument by Coombs in the second wave, the share is 88.2%. The respondents of the instrument by Terhune and Kaufmann show a slightly lower fraction of consistent answers (83.2%). Consequently, Kappa achieves high levels of test-retest reliability for all these instruments.

This applies to the parallel-test analyses as well, although the levels of consistency are slightly lower. Among the respondents who replied to the instrument by Coombs in the first wave and to the instrument by Terhune and Kaufmann in the second wave, 77.9% reported the same number of children twice. For the respondents who answered to these instruments in a reverse order, the share is 80.5%.

However, the results for the numbers of children evaluated as second and third alternatives document lower levels of consistency and, therefore, only moderate levels of reliability can be achieved. This holds both for test-retest and parallel-test analyses. There is already a remarkable decline of reliability according to the number of children ranked second. Again the unmodified and modified instrument by Coombs leads to the highest shares of identical answers in the two waves (75.4% resp. 72.2%). According to the instrument by Terhune and Kaufmann, its test-retest reliability is much lower and only around two-third of the respondents named an identical number of children. A similar pattern can be observed for the number of children ranked third.

According to the fourth preference, higher levels of reliability can be observed, which are above the ones reported for the family sizes ranked second. One possible explanation for this result is, that respondents are more certain about the numbers of children they do not want to have compared to the numbers of children that might be more realistic alternatives to their mostly desired reproductive aims.¹⁸ In the case of the instrument by Coombs, however, there is also a design-effect present, because at the fourth level, respondents can only decide between childlessness or four or more children.

These descriptive results are supported by multivariate analyses. According to the mostly desired number of children (see Table 13a), respondents who had to reply to the instrument by Coombs twice, reported with a lower probability a different family size in the second wave than respondents who replied to the instrument by Terhune and Kaufmann for two times. The coefficients also show higher levels of discontinuity for the parallel-test designs. However, all these effects are not significant.

This alters in the case of respondents' family size preferred second (Table 13b). The coefficients show again a higher stability of answers for the respondents who answered the instrument of Coombs twice, but now the parallel-test designs show significant results. For both combinations of instruments presented to the respondent, there is a

¹⁸ This interpretation is also supported by a relatively high level of test-retest reliability ($\kappa = 0.714$) according to the family size preferred 5th by respondents who replied to the instrument by Terhune and Kaufman in both waves.

TABLE 13:
EFFECTS OF SURVEY INSTRUMENTS ON CONTINUITY AND CHANGE OF DESIRED FAMILY SIZE
(1ST AND 2ND WAVE)

A) 1ST PREFERENCE

	Change of preference order		
	Decrease	Constant	Increase
<i>Ist wave: Coombs</i>			
2 nd wave: Coombs (modified and unmodified)	0.671 (0.209)	Ref.	0.832 (0.224)
2 nd wave: Terhune and Kaufmann	1.476 (0.469)	Ref.	1.424 (0.411)
<i>Ist wave: Terhune & Kaufmann</i>			
2 nd wave: Coombs	1.246 (0.397)	Ref.	1.172 (0.342)
2 nd wave: Terhune and Kaufmann	Ref.	Ref.	Ref.
Log likelihood		-745.865	
χ^2 (df)		152.86 (40)***	
N		1,358	

B) 2ND PREFERENCE

	Change of preference order		
	Decrease	Constant	Increase
<i>Ist wave: Coombs</i>			
2 nd wave: Coombs (modified and unmodified)	0.787 (0.189)	Ref.	0.783 (0.174)
2 nd wave: Terhune and Kaufmann	0.806 (0.229)	Ref.	1.556* (0.371)
<i>Ist wave: Terhune & Kaufmann</i>			
2 nd wave: Coombs	0.793 (0.219)	Ref.	2.268*** (0.500)
2 nd wave: Terhune and Kaufmann	Ref.	Ref.	Ref.
Log likelihood		-964.657	
χ^2 (df)		228.24 (40)***	
N		1,216	

C) 3RD PREFERENCE

	Change of preference order		
	Decrease	Constant	Increase
<i>Ist wave: Coombs</i>			
2 nd wave: Coombs (modified and unmodified)	1.129 (0.268)	Ref.	0.844 (0.180)
2 nd wave: Terhune and Kaufmann	1.546 (0.415)	Ref.	1.370 (0.331)
<i>Ist wave: Terhune & Kaufmann</i>			
2 nd wave: Coombs	0.873 (0.242)	Ref.	3.448*** (0.738)
2 nd wave: Terhune and Kaufmann	Ref.	Ref.	Ref.
Log likelihood		-965.046	
χ^2 (df)		334.19 (40)***	
N		1,142	

TABLE 13 (CONTINUED)

D) 4TH PREFERENCE

	Change of preference order		
	Decrease	Constant	Increase
<i>1st wave: Coombs</i>			
2 nd wave: Coombs (modified and unmodified)	0.306*** (0.105)	Ref.	2.192*** (0.504)
2 nd wave: Terhune and Kaufmann	0.981 (0.331)	Ref.	2.354*** (0.644)
<i>1st wave: Terhune & Kaufmann</i>			
2 nd wave: Coombs	1.168 (0.386)	Ref.	13.600*** (3.180)
2 nd wave: Terhune and Kaufmann	Ref.	Ref.	Ref.
Log likelihood		-697.826	
χ^2 (df)		378.56 (40)***	
N		931	

Notes: All analyses control for gender, age, number of children born, level of education, income, area of living, marital status, employment situation, and number of children named as 1st, 2nd, 3rd, or 4th preference in the first wave.

Levels of significance: * ≤ 0.1 ; ** ≤ 0.05 ; *** ≤ 0.01 .

significantly higher chance, that a larger family size was named in the second wave. This holds especially for the respondents who replied first to the instrument by Terhune and Kaufmann and afterwards to the instrument by Coombs. A similar pattern can be found for the family sizes preferred third (Table 13c).

According to the family size named as fourth preference, however, all combinations of instruments that included the instrument by Coombs show higher levels of instability as the combination in which the respondents had to reply to the instrument by Terhune and Kaufmann twice (Table 13d), because of a significantly higher chance to report a larger family size in the second wave.

The instruments' different levels of reliabilities are supported by analyses about the consistencies of complete preference orders (see Table 14). In the case of the modified and unmodified instrument by Coombs, more than 60% of the respondents reported an identical preference order twice. However, one has to keep in mind that many respondents reported preference orders of only two or three levels, because they have reached the borders of possible family size. This significantly decreases the heterogeneity of possible reproductive hierarchies. Consequently, the reliability of preference orders reported in the instrument by Terhune and Kaufmann is much lower, but at least 42.9% of the respondents reported the same order of reproductive aims in both waves. The parallel-tests, which only consider respondents who have reported a complete preference order of four levels in the instrument by Coombs, show low levels of reliability. This has to be expected given the comparatively low shares of identical numbers of children at all levels of the reproductive hierarchy (see Table 12).

TABLE 14:
SHARE OF IDENTICAL ORDERS OF REPRODUCTIVE PREFERENCES BY KIND OF RELIABILITY-TEST
(PANEL POPULATION)

	Test-retest			Parallel-test	
	1 st wave			1 st wave	
	Coombs		Terhune & Kaufmann	Coombs	Terhune & Kaufmann
	2 nd wave			2 nd wave	
	Coombs ③	Modified Coombs ④	Terhune & Kaufmann ⑦	Terhune & Kaufmann ⑤	Coombs ⑥
Identical preference order	62.4 (143)	61.0 (136)	42.9 (150)	27.5 (33)	31.1 (33)
Kappa	0.572***	0.559***	0.388***	0.169***	0.266***
N	229	223	250	120	106

Notes: Encircled numbers in cell titles indicate the cells in Table 1.

^a Only respondents considered who reported a complete preference order of four levels in the instrument by Coombs.

Levels of significance: * ≤ 0.1 ; ** ≤ 0.05 ; *** ≤ 0.01 .

To what extent are these results caused by inaccuracies of the instruments or by the fact that respondents do not have a clear preference order? According to the instrument by Terhune and Kaufmann, the latter interpretation is more plausible. In this instrument, respondents are not directly asked to name their second, third, or fourth preference. This order is constructed afterwards by data analysis. All pairs of numbers of children are presented in the same way. Thus, in the hypothetical case that inconsistent answers are only caused by the instrument's inaccuracy of measurement, one has to expect equal results of low reliability at all levels of preference. This is not the case. One has to conclude that the lower degrees of reliability at lower preference levels are very much caused by respondents' uncertainty or undecidedness.

The interpretation for the instrument by Coombs is different. Here, the family sizes preferred first, second, third and fourth are directly addressed by different questions. Especially the question about the mostly desired number of children is completely different from the ones about family sizes at lower preference levels. Thus, one cannot exclude the possibility that the first question is more reliable than the subsequent ones. Of course, influences of undecided or uncertain respondents are present as well. At the same time, however, the instrument by Coombs shows higher levels of test-retest reliability as the instrument by Terhune and Kaufmann. Here, one has to consider the path-dependent structure of the Coombs-instrument. Once a respondent has decided for an ideal family size, he or she is put on a particular track of questions that addresses only a small number of combinations of alternative family sizes. This holds especially for the fourth preference, where respondents have to decide only between four children or childlessness. Thus, there are less opportunities to report different preferences for reproductive aims than in the instrument by Terhune and Kaufmann. One has to assume,

therefore, that by reducing the number of possible combinations of different family sizes, the instrument by Coombs automatically increases its reliability.

According to the parallel-test-analyses, the results are mixed. Respondents who replied to the instrument by Terhune and Kaufmann in the first wave and to the instrument by Coombs in the second show degrees of reliability for the first three reproductive aims that are close to the one's generated by the test-retest designs. This result supports the idea of the instrument by Terhune and Kaufmann to measure a hierarchy of desired family sizes in an indirect way. Although the instrument does not explicitly address an order, many respondents rank family sizes in the same way as they do afterwards in the instrument by Coombs. However, one has also to consider that the variance of the instrument by Coombs decreases at each level in the hierarchy, because more and more respondents reach the borders of possible family size and are selected out.

Contrary to this result, the combination Coombs-instrument in the first wave and the instrument by Terhune and Kaufmann in the second wave documents the lowest degrees of reliability at each level of preferred family sizes. This result raises a question about the reliability of the instrument by Coombs compared to the instrument by Terhune and Kaufmann. The Coombs-instrument produces high reliabilities in a test-retest-design, but not in a parallel-test-design.

6. Conclusions

The purpose of this paper was to explore, whether the survey-instruments by Coombs (1974) and Terhune and Kaufmann (1973) have the potential to be fruitfully applied in European low-fertility contexts. Both instruments measure fertility-related desires as hierarchies of reproductive goals. They, therefore, significantly extend traditional measurements of reproductive preferences, which address only the single number of children that is ideally desired, realistically expected, or socially approved. A detailed exploration of the two instruments became necessary, because they were up to now only used in societies with high fertility. Moreover, there is a need to improve the measurement of reproductive desires in order to make progress in the understanding of fertility-related decision-making and to close the gap between reproductive desires and achieved fertility. The instruments by Coombs and Terhune and Kaufmann have the potential to improve this situation, as preference orders of reproductive aims inform about individuals' latent desires for having a larger or smaller family. I.e. they inform about the direction an individual will probably move, if he or she is not able to achieve his or her mostly desired reproductive aim.

Both instruments collect similar information by two different methods. The instrument by Coombs rests on the principle of forced choice. Once respondents have named their ideal number of children, they subsequently have to make explicit decisions about their reproductive goals that are preferred second, third, and fourth. The instru-

ment by Terhune and Kaufmann rests on the method of pairwise comparison. Respondents are confronted with all possible pairs of family sizes and they always have to decide for one alternative. A preference order of reproductive goals is constructed afterwards during data analysis.

In spite of these differences, both instruments provide hierarchies of desired family size that are both similar and different. Both document a clear preference for a family with two children as the mostly desired reproductive goal, followed by preferences for having three children or of being childless. According to the family sizes that are evaluated as a second, third, or fourth alternative, however, the results differ. This is very much caused by the path-dependent nature of the instrument by Coombs. The number of children named as the ideal reproductive goal predefines the family sizes addressed in the subsequent questions. Moreover, once respondents have reached the upper or lower border of possible family size, they are filtered out. This significantly reduces the variance of family sizes covered by the instrument. However, the instrument by Coombs covers most of the hierarchies that are reported by the respondents that answered the instrument by Terhune and Kaufmann. Only a minority of respondents reported large jumps in their reproductive orders. Most change their desires child by child or revolve around their ideal family size. This pattern corresponds to the logic how family sizes are addressed in the instrument by Coombs.

Otherwise, the non-consideration of uncommon preference orders may produce biased information on important groups of respondents. Significantly inconsistent hierarchies may be indicators for individuals who are uncertain about their alternative reproductive goals. These respondents cannot be identified by the instrument by Coombs and they are forced to report a streamlined sequence of reproductive aims. Additionally, the instrument by Coombs limits the number of revolving preference orders. If respondents name an ideal family size of one child and subsequently decide for childlessness or if they mostly prefer to have three children and address four or more children as their second preference, they are filtered out. In the instrument by Terhune and Kaufmann, however, 17.9% of the respondents with an ideal family size of one child named an order of 1-0-2-X and 24.4% of the respondents who ideally like to have three children reported an order of 3-4-2-X.

Otherwise, the order 1-0-2-X raises the general question about the meaning of childlessness. In the instrument by Terhune and Kaufmann, childlessness is just one possible reproductive alternative. In the instrument by Coombs it is a state where individuals cannot turn back to fertility. However, without a general theoretical clarification about the meaning of childlessness in modern societies this methodological question cannot be answered.

The instruments by Coombs and Terhune and Kaufmann have some specificities that may have a biasing effect on the data they provide. The compelling character of the

instrument by Coombs forces some respondents to report an artificial hierarchy of reproductive goals. However, this problem can be solved by adding answer categories at the beginning of the instrument, where respondents can express that they have not thought about the desirability of particular family sizes up to now. The fact that respondents who were confronted with the instrument by Coombs, report systematically more often two children as an ideal family size than the respondents of the instrument by Terhune and Kaufmann may indicate a biasing effect due to social desirability. However, this is a very first result. More detailed analyses that also consider characteristics of the respondents are needed in order to identify a systematic effect of social desirability. Finally, the instrument by Terhune and Kaufmann is sensitive to placement effects. Due to the instrument's repetitive character, respondents systematically tend to decide more often for the number of children that is named first in the pair of alternative family sizes. This problem can be solved to some extent by assigning randomly, which number of children is presented first and second.

The analysis of the reliability leads to mixed results. Both instruments have high levels of reliability according to the mostly desired number of children and they show moderate levels of reliability for the numbers of children preferred as second, third, or fourth alternative. In a test-retest design, the instrument by Coombs documents a higher reliability at all levels of preference compared to the instrument by Terhune and Kaufmann. This result has to some extent be expected given the smaller variance of possible family sizes and the path-dependent character of the instrument by Coombs. In the case of a parallel-test, however, the instrument by Terhune and Kaufmann shows higher reliability. In general, more refined analyses are needed to improve the understanding of the instruments' accuracy and consistency of measurement. This is because the reported levels of reliability are also influenced by the respondents' certainty and uncertainty about their reproductive goals. One can assume that individuals may be more certain about their mostly desired goal than about possible alternative family sizes. Thus, the reliability of the numbers of children preferred second and third may decline not because of the instruments used, but because respondents' uncertainty.

Do the analyses reported in this paper allow for any recommendation for one of the two instruments? The benefits of the instrument by Coombs are clearly its short length and its high test-retest reliability. However, the analyses also document a variety of shortcomings: the low heterogeneity of reported preference orders, the high number of orders of short length, the mix of ideal and realistic preferences, the probable sensitivity to social desirability, the compelling character to report a clear preference order, and the low parallel-test reliability. Many of these problems are inherent to the instrument and cannot be reduced without substantive changes. The instrument by Terhune and Kaufmann avoids most of these problems. Moreover, it produces a larger variation of preference orders with equal lengths and it allows for revolving preference orders for all

respondents with an ideal family size of one, two, or three children. It's repetitive character, however, runs at risk to create mechanically given answers and it's test-retest reliability is remarkably lower than the one of the Coombs-instrument.

In general, one has to conclude that there are more arguments supporting the instrument by Terhune and Kaufmann than the instrument by Coombs. However, this recommendation is very limited, as no information on the instruments' validity is reported. Moreover, the meaning of alternative family sizes has to be clarified. Many results on respondents' second, third, and fourth reproductive alternatives indicate to some extent that respondents are uncertain about these aims. This becomes especially evident in the case of their low levels of reliability. Furthermore, many respondents do not show a clear latent desire for a smaller or larger family. They revolve around their mostly desired reproductive aim. This pattern of reproductive preferences primarily strengthens the significance of the mostly desired size of a family, but it does not give a clear impression about reproductive alternatives.

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