Title: Where are all the men? Exploring the lack of male participation in childbearing research using the Theory of Planned behaviour.

Running head: Male participation in childbearing research

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Abstract

The current study examined whether the Theory of Planned Behaviour (TPB) could account for the disproportionately low participation rates of men in childbearing and fertility research and whether the addition of distal factors could help identify the men missing from this specific field of health research. The study was of longitudinal design, comprising two online surveys measuring the TPB constructs (attitudes, subjective norms, perceived behavioural control), distal factors (e.g., desire for a child) intentions to participate in childbearing research (time 1) and childbearing research behaviour (time 2). More women ($n=623$) than men ($n=176$) participated. Structural models revealed the TPB constructs accounted for 37% and 1% of the variance in intentions and behaviour respectively. Attitudes had the strongest association with intentions ($\beta=.53$). Men had significantly less favourable attitudes ($p=.000$) and lower intentions than women ($p=.01$). TPB constructs fully and partially mediated associations between distal factors and intentions. The modification of attitudes is likely to be the mechanism that would elicit intention (and behaviour) change amongst those likely to be missing from childbearing and fertility research, namely men not yet at the stage of starting a family. Increasing male participation will help identify unmet needs in research and policy that concern men.

Key words: Male participation; childbearing research; fertility, infertility, Theory of Planned Behaviour

Introduction

The Priority Setting Partnership for Infertility (Duffy et al., 2020) placed understanding male infertility as a priority for fertility research. However, the rates of male participation in this specific field of health research are disproportionately low compared to those of women (Boivin et al., 2019; Almeida-Santos et al., 2017) with ratios of 9 female participants for every male participants reported in survey research (e.g., Bunting, et al., 2013), more so in research with men not in fertility treatment (Culley et al., 2013). This occurs despite similarity between men and women in desire for children and factors that affect readiness to parent (Boivin et al., 2018a). This imbalance points to a lack of representativeness of the existing research base concerning male childbearing preferences and behaviour and indirectly emphasises the need to understand the reasons why men have disproportionately low participation rates in this specific field of health research. Understanding why men have low participation rates could help identify what could be done to increase their participation especially if we are to meet the goals of the priority setting partnership. In the present study we examined whether the Theory of Planned Behaviour (TPB; Ajzen, 1991) could account for variations in participation rates and whether the inclusion of distal factors could help identify the men missing from the fertility and childbearing research.

The determinants of participation in fertility and childbearing research may be understood by using the TPB, a psychological theory of human motivation that has received support for its ability to predict a wide variety of health behaviours (e.g., exercise, healthy eating, reproductive health; Cortis et al., 2017). According to the theory, individuals are more likely to participate in childbearing research if they intend to participate, have favourable attitudes towards participation, experience social normative pressure (i.e., subjective norms) to participate and have the necessary resources to do so (i.e., perceived behavioural control). The theory assumes that the three core constructs, attitudes, subjective norms and perceived behavioural control, co-vary with one another and that the implementation of intention is more probable when all three influencing factors are positive (Ajzen, 1991).

Accordingly, there are a number of possible explanations for why men may have disproportionately low participation rates in childbearing research compared to women.

First, men may not participate in childbearing research because they have a general unfavourable attitude and lack of interest in participating in research in general, or fertility and childbearing research in particular. Men have been shown to be less likely to respond to survey requests (e.g., Groves et al., 1992; Saleh & Bitar, 2017) and have higher drop-out rates compared to women (Jokela, et al, 2009). This pattern of (non) participation is evident across a variety of different research topics. For example, research on depression (Siegel et al., 2012), exercise behaviour (Mullan et al., 1997) and

sexuality (Miller et al., 2013; Tamas et al., 2019) all show ratios of fewer men than women participating. Agadjanian (2002) found that men tend to communicate about reproductive matters only when these affected them personally. This finding suggests that interest and participation in fertility and childbearing research could be mainly confined to specific reproductive events such as the birth of a child, or when matters affect men via their partners (e.g., pregnancy), with comparatively less interest and/or participation shown at other times.

Second, the paucity of men participating in fertility and childbearing research may reflect social norms and the gendered nature of fertility and childbearing. The development of the first effective contraceptive pill in 1961 (Junod & Marks, 2002) has resulted in reproduction being socially constructed to be a female issue and responsibility. Therefore, engaging in childbearing research could be perceived as part of the female role and social norms could act as possible deterrents for men considering participation (Goldschieder, 2000; Jamieson et al., 2010; Robinson & Brewster, 2014; Schacher et al., 2005).

While the TPB has received support for its ability to predict and explain a wide variety of health behaviours (e.g., contraception, exercise) meta-analytic reviews have also shown the core constructs, attitudes, subjective norms and perceived behavioural control, to only account for approximately half of the variance in intentions (e.g., Armitage & Conner, 2001; Conner & Armitage, 1998; Cortis et al., 2017). Further, research often demonstrates an intention behaviour gap (i.e., intention does not always translate to behaviour e.g., Michaelidou & Hassan, 2014). This has led to the proposition that the inclusion of distal factors (those not specified by the TPB) to the model could increase its predictive ability (Conner & Armitage, 1998). Distal factors previously examined have included personality (Bruijn et al., 2005a), gender, age (Bruijn et al., 2005b) and attitudes other than those directly related to the behaviour (e.g., career attitude in intentions to have children, Barber, 2001). This research has found distal factors to have direct and indirect effects with intention and behaviour (Harakeh et al., 2004) and to be important for the identification of critical target groups for directed behaviour change interventions (Bruijn et al., 2005b). The inclusion of distal factors when examining intentions to participate in childbearing research could therefore provide a more complete explanation for why men have low participation rates, providing fundamental insight into what could be done to increase participation.

In light of the above, the goals of the current study were to examine whether the TPB could account for variations in participation rates and whether the addition of distal factors could help identify the men missing from the fertility and childbearing research and thus what could be done to increase their participation.

Methods

Participants

Eligibility criteria was being 18 years or older and able to respond in English. Sample size was based on the recommended minimum sample size needed for Structural Equation Modelling (SEM) which sets the lower limit to 200 respondents (Kline, 2005). A power calculation (G*Power; Faul et al., 2007) for multi-group analysis of variance estimated a total sample of 76 for intended regression analysis ($f^2=.15$, $\alpha=.05$, power=.85).

Materials

The Participation in Research Survey (PRS) was a two-part (PRS1, PRS2) longitudinal, quantitative, English, online survey created using SurveyTracker. The information sheet introduced the survey as: *“The goal of the present study is to better understand the participation of men and women in research generally and in fertility and childbearing research specifically. By childbearing we mean trying to conceive, achieve a pregnancy or father a child”*. Questions centred on preferences and intentions to participate in childbearing research and related distal factors. Psychological theories (e.g., Theory of Planned Behaviour, Ajzen, 1991) as well as a review of the literature on men and decision-making about having a family (1990 onwards) informed the selection of items in the PRS. The PRS measured the TPB constructs attitudes, subjective norms, perceived behavioural control, intentions and distal factors (Time 1, PRS1) and behavioural participation in fertility and childbearing research (Time 2, PRS2). Survey wording was adapted so that it would be applicable to men and women who had/had not had children. Only those questions relevant to the current analysis are presented in this paper are described. The School of Psychology, Cardiff University provided study ethical review and approval (EC.11.02.01.2747G).

Theory of planned behaviour constructs

The TPB constructs were adapted from Francis et al. (2004) and Ajzen (1991). Eight items, rated on a six-point response scale, were used to assess attitudes towards participation in childbearing research (Cronbach reliability coefficient was $\alpha=.94$). A further eight items measured subjective norms. Four items assessed the extent to which significant others (e.g., partner, family) would want the person to participate in childbearing research and a further four items measured motivations to comply with these wishes (Cronbach reliability coefficient was $\alpha=.87$). Perceived behavioural control was measured using five items (Cronbach reliability coefficient was $\alpha=.74$). Three items assessed controllability (e.g., it is easy to participate), and two items measured self-efficacy (e.g., the decision to participate is out of my control). Intentions to participate in childbearing research were measured

using three items (Cronbach reliability coefficient was $\alpha=.89$). Subjective norms, perceived behavioural control and intentions were all rated on a five-point response scale. For all the constructs, higher scores indicated more of the attribute/agreement. Research behaviour was the outcome measure. At the end of the T1 questionnaire, participants were invited to leave their email address to receive more information about upcoming fertility and childbearing research. At T2, three months later, participants were sent an invitation to a brief 15-minute online survey on fertility and childbearing. Whether or not respondents participated in the second study, three months later, was used as the outcome measure research behaviour (0=did not participate, 1=did participate).

Distal factors

Distal factors included demographic and fertility characteristics. Participants indicated their gender (0=male, 1=female) age (in years) marital status (0=single, 1=married/cohabitating), total years married/together, sexual orientation (0=bi-sexual, gay/lesbian, homosexual, prefer not to say, 1=heterosexual), education level (0=below university level, 1=at least university level) employment status (full time, part time, unemployed, student, retired) and whether they had previously given birth/fathered a child (0=no, 1=yes). Participants were asked to rate their interest in nine research areas, on a five-point scale (Cronbach reliability coefficient was $\alpha=.78$) in addition to their desire to have a (another) child, on a ten-point scale, where higher scores meant more interest in research and stronger childbearing desire respectively. Four items adapted from Tough et al. (2007) were used to measure perceived costs of childbearing (Cronbach reliability coefficient was $\alpha=.74$) and items adapted from the International Social Survey Program (ISSP, 2002) were used to measure gender roles. Cronbach reliability coefficient was $\alpha=.70$. Items were rated on a five-point response scale. Higher scores indicating more perceived costs of childbearing and traditional gender role orientation respectively. Contraceptive preference was measured on a five-point response scale, using the extent of agreement with the single statement 'women should take care of contraception'. Decision-making preferences for five contraceptive and childbearing issues were rated on a five-point response scale (Cronbach reliability coefficient was $\alpha=.70$). Higher scores meant more personal control over reproductive issues. Items were adapted from the Demographic Health Survey (2008-2013).

Procedure

The PRS1 was uploaded onto survey tracker and distributed via a recruitment email containing a URL link that was sent to the students and staff at a public university. Upon clicking the URL link, an information and consent form was presented. The survey took approximately 15 minutes to complete. At T1 respondents were asked to leave their email address if they were interested in hearing about upcoming childbearing research. Unknown to the respondents, those who left their email would be

contacted (via email) three months later, and asked for their participation in a five minute, online, fertility and childbearing survey (PRS2), uptake of which was, as mentioned, used as the measure of research behaviour. The email sent out to this subsample included a brief description of the questionnaire and a URL link. Respondents were not informed at T1 that they would receive an invitation to a second survey to avoid influencing uptake. However, at the end of the study all the participants were fully debriefed about the procedures including the need for this deception.

Statistical Analysis

Descriptive statistics were used to profile the sample on socio-demographic characteristics. The t-test (*t*) and chi-square (χ^2) were used for gender and group comparisons (as relevant based on units of measurements) and reliability was assessed using Cronbach alpha coefficient (α). Multiple items measuring the same construct were used to create composite variables.

Structural equation modelling (SEM) examined whether the TPB could account for the variation in research participation rates. SEM provides an estimate of the magnitude and significance of the causal connections between the main constructs in addition to the evaluation of the global fit between a hypothesized model and the data (Peyrot, 1996). Standardized regression (path) coefficients are presented. Kline (2005) recommended the following indices to investigate model fit: (a) χ^2 goodness of fit test (b) Comparative Fit Index (CFI; Bentler, 1990), (c) Root-Mean-Square Error of Approximation (RMSEA; Steiger & Lind, 1980). The χ^2 is the most frequently used measure of overall model fit, wherein a good model will produce a non-significant χ^2 value. The CFI assesses the relative improvement in fit of the proposed model compared with a null model that assumes no relationship (i.e., zero population covariances). CFI values range from 0 to 1, with values approximating 1 indicating a model with good fit. CFI values of <.90, however, suggest that the model can be improved (Bentler, 1990). Finally, the RMSEA assesses how well the proposed model fits the population covariance matrix were it available (Browne & Cudeck, 1993). RMSEA values less than .10 indicate an acceptable fit whereas values lower than .08 indicate good fit (Kline, 2005). Multiple regression analysis with intention as the dependent variable was used to assess whether there was a relationship between the distal factors and intentions to participate in childbearing research and whether any relationships present were mediated by the TPB constructs and/or moderated by gender. In the first step of this analysis (Model 1), the distal factors were entered. In the second step (Model 2) attitudes, subjective norms and perceived behavioural control were entered and in the third step (Model 3) gender interactions were entered. Statistics were standardized beta coefficients (β). The probability value of .05 was considered significant.

The sample for the SEM analysis was restricted to individuals who had left their email address at T1 because the outcome measure of research behaviour was whether or not respondents responded to the study email invitation sent at T2. The total sample at T1 was used for the multiple regression analysis.

Results

Recruitment outcome

A total of 799 people (men 176, women 623) from a public university participated in the study. Table 1 shows the demographic and fertility characteristics of the total sample and the sub sample who left their email address. More women ($n=623$) than men ($n=176$) participated in the PRS1 with an overall ratio of female:male of about 4:1. Of the sample participating at T1, 288 (36%) significantly more women ($n=239$) than men ($n=49$) left their email to obtain further information with an overall ratio of about 5:1 ($\chi^2=6.59$, $p<.05$). Of the 288 individuals, 132 (115 women, 17 men) participated at T2, with a ratio of 7:1. The gender difference was not significant for participation at T2 ($\chi^2=2.95$, $p=.09$).

As shown in Table 1, the mean age of participants at T1 was 29 years, the majority of participants were university educated, students, single and had not given birth/fathered a child. Men were significantly older, more likely to be employed and be from the LGBT community compared to women. Those who left their email at T1 were more likely to be heterosexual ($\chi^2(1)=3.795$, $p=.05$), to have given birth/fathered a child ($\chi^2(1)=9.993$, $p<.01$), be in full time employment ($\chi^2(1)=6.661$, $p<.05$) to have been in a relationship longer ($t=797=2.371$, $p=.01$) and were less likely to be students ($\chi^2(1)=16.032$, $p<.001$) compared to those who did not leave their email at T1. No significant differences were found between men and women for the sub sample.

1 Table 1

2 Descriptive statistics for background characteristics, t-test and chi-square for men and women according to total and subsample

Variable	Total sample T1				Subsample left email			
	Total sample (N=799)	Men (n=176)	Women (n=623)	Gender test statistic t/χ^2	Total sample (N=288)	Men (n=49)	Women (n=239)	Gender test statistic t/χ^2
<i>Demographic</i>								
Age in years ($M \pm SD$)	28.95 (11.22)	31.17 (12.9)	28.32 (10.5)	3.00**	29.59 (10.3)	31.96 (12.9)	29.10 (9.7)	1.77
At least university educated (n (%))	574 (71.8)	134 (76.1)	440 (70.6)	2.06	210 (72.9)	37 (75.5)	173 (72.4)	0.20
Full time employment (n (%))	289 (36.2)	75 (42.6)	214 (34.3)	4.06*	121 (42.0)	23 (46.9)	98 (41.0)	0.59
Student (n (%))	429 (53.7)	92 (52.3)	337 (54.1)	0.18	139 (48.3)	24 (49.0)	115 (48.1)	0.01
<i>Marital status</i>								
Married/Cohabiting (n (%))	364 (45.6)	82 (46.6)	282 (45.3)	0.13	158 (54.9)	26 (53.1)	132 (55.2)	0.08
Years together (for those partnered) ($M \pm SD$)	5.38 (8.5)	5.62 (8.8)	5.31 (8.4)	0.44	6.32 (8.01)	7.33 (9.88)	6.12 (7.5)	0.96
<i>Sexual orientation</i>								
Heterosexual (n (%))	737 (92.3)	154 (87.5)	583 (93.6)	7.83*	273 (94.8)	47 (95.9)	226 (94.6)	0.15
<i>Fertility history</i>								
Given birth/fathered a child (n (%))	186 (23.4)	45 (25.6)	141 (22.6)	0.59	85 (29.5)	13 (30.6)	70 (29.3)	0.05

3 Note. N and n=Sample size, M= mean, SD = standard deviation. T1=time one, t-test for continuous data, chi-square for categorical data.

4 * $p < .05$, ** $p < .01$, *** $p < .001$

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Does the TPB account for variation in fertility and childbearing research participation?

Table 2 shows descriptive statistics for the TPB constructs (T1) that were used in the SEM and regression analysis. Of the total sample, men had significantly less favourable attitudes and lower intentions to participate in childbearing research compared to women. Of those who left their email at T1, men had significantly less favourable attitudes compared to women.

12 Table 2

13 *Descriptive statistics for the variables used in the SEM and regression analysis for men and women according to total (regression) and subsample (SEM).*

	Total sample T1				Subsample left email address			
	Total (<i>n</i> =799)	Men (<i>n</i> =176)	Women (<i>n</i> =623)	<i>p</i> value	Total (<i>n</i> =288)	Men (<i>n</i> =49)	Women (<i>n</i> =239)	<i>p</i> value
Attitudes towards participation in childbearing research ^a (<i>M</i> ± <i>SD</i>)	2.87 (0.87)	2.65 (0.85)	2.93 (0.87)	0.00	3.42 (0.79)	3.22 (0.82)	3.46 (0.78)	0.05
Subjective norms about participation in childbearing research ^b (<i>M</i> ± <i>SD</i>)	2.66 (0.69)	2.69 (0.68)	2.65 (0.71)	0.55	2.76 (0.68)	2.79 (0.66)	2.75 (0.68)	0.72
Perceived behavioural control about participation in childbearing research ^b (<i>M</i> ± <i>SD</i>)	3.96 (0.72)	3.89 (0.76)	3.99 (0.70)	0.12	4.12 (0.68)	3.98 (0.72)	4.15 (0.66)	0.12
Intention to participate in childbearing research ^b (<i>M</i> ± <i>SD</i>)	3.08 (0.95)	2.91 (0.93)	3.13 (0.95)	0.01	4.12 (0.67)	3.44 (0.74)	3.56 (0.87)	0.36

14 *Note.* SEM=structural equation modelling, *M*= mean, *SD* = standard deviation. T1=time one. For all response scales, higher scores mean more of the attribute. ^arange 0-5, ^brange 1-5. *p* values

15 from t-tests for gender difference, *p* values ≤.05 for gender differences considered significant.

To examine whether the TPB could account for the variation in participation rates, the associations between the TPB constructs (PRS1) and actual research behaviour (PRS2) were explored using SEM. Figure 1 shows that in total Attitudes, subjective norms and perceived behavioural control accounted for 37% of the variance in intention to participate at T1. The TPB core constructs were all significantly and positively associated with intentions in addition to the covariances between attitudes and subjective norms and attitudes and perceived behavioural control. Regression (path) coefficients showed the relationship between attitudes and intentions was the strongest. However, intention to participate at T1 was not significantly related to research behaviour at T2 and only 1% of the variance in research behaviour was accounted for by the TPB constructs. Goodness of fit indices demonstrated the model to fit the data ($\chi^2=7.39$, $df=2$, $p<.05$, RMSEA =.09, CFI .96).

Figure 1: Theory of planned behaviour model applied to behavioural participation in childbearing research ($n=288$). Values displayed are standardised regression weights (→), covariances (↔) and percent variance accounted for intentions at time one (T1) and research behaviour at time two (T2).

* $p<.05$, ** $p<.01$, *** $p<.001$

Can the addition of distal factors help identify the men missing from research?

Multiple regression analysis was carried out to examine whether the addition of the distal factors could help identify the men who were missing from fertility and childbearing research. This analysis

involved examining whether or not correlates of fertility and childbearing decision-making were associated with intentions to participate and whether or not any associations present were mediated by the TPB constructs or moderated by gender. Table 3, Model 1, shows that in total 22.2% of variance in intentions to participate in childbearing research was accounted for by the distal factors (Adjusted $R^2=.20$, $F(14,735)=10.52$, $p<.001$). Being a woman, having given birth/fathered a child, desiring a child and having higher interest in research were significantly and positively associated with intentions to participate. The addition of the core constructs of the TPB into the regression (Model 2) significantly increased the total amount of explained variance in intentions ($\Delta R^2=.25$) to 47.3% (Adjusted $R^2=.46$ $F(17,735)=18.40$, $p<.001$). Attitudes and perceived behavioural control were positively and significantly associated with intention to participate. Introduction of the TPB constructs fully mediated the relationships between desire for a child, gender and intentions with the associations among these distal factors becoming non-significant. The associations between having given birth/fathered a child, interest in research and intentions were reduced but remained significant with the addition of TPB constructs. Specifically, having ever given birth/fathered a child was partially mediated by attitudes ($p<.001$) and perceived behavioural control ($p=.04$) while interest in research was partially mediated by attitudes ($p<.001$). Inclusion of gender interactions (Model 3) increased the total amount of explained variance in intentions to 48.7% (Adjusted $R^2=.47$ $F(30,722)=22.89$, $p<.001$). However, this increase ($\Delta R^2=.02$) was not significant and therefore follow-up tests were not performed.

Table 3

Multiple regression analysis with intention to participate in childbearing research as the dependent variable and distal factors (Model 1) and TPB constructs (Model 2) as the predictors with gender interaction (Model 3).

Variable	B	SE B	β
Model 1			
<i>Socio-demographic and Life course</i>			
Age	0.00	0.06	0.00
Married/cohabiting ^a	0.16	0.08	0.08
Years together	-0.02	0.05	-0.02
Gender	0.23	0.08	0.10**
Given birth/fathered a child	0.51	0.11	0.23***
Heterosexual ^c	-0.06	0.08	-0.03
At least university education	0.11	0.06	0.06
Full time employment	0.02	0.03	0.02
<i>Childbearing interest and perceived costs</i>			
Desire for a child	0.17	0.04	0.18***
Costs of childbearing	-0.02	0.04	-0.02
<i>Gender role orientation</i>			
Traditional gender role	0.05	0.05	0.03
<i>Contraceptive preferences</i>			
Women take care of contraception	-0.05	0.03	-0.05

Variable	<i>B</i>	<i>SE B</i>	β
Personally deciding about childbearing issues	-0.05	0.05	-0.04
<i>Research interest</i>			
Interest in research	0.47	0.05	0.30***
ΔR^2		0.22***	
<i>F</i>		15.08	
Model 2			
<i>TPB constructs</i>			
Attitudes	0.60	0.04	0.52***
Subjective norms	0.05	0.04	0.04
Perceived behavioural control	0.13	0.04	0.10***
ΔR^2		0.25***	
<i>F</i>		38.75	
Model 3			
<i>Interactions</i>			
Contraceptive decision*Gender	0.36	0.11	0.24**
Traditional *Gender	-0.24	0.11	-0.14*
ΔR^2		0.02	
<i>F</i>		22.89	

Note. TPB=Theory of Planned Behaviour. Gender (1=women), *B*=unstandardised beta, *SE B*=standard error, β =standardised beta, ^amarried/cohabiting compared against being single, ^b employed (0) student (1), ^cHeterosexual (1) compared to bi-sexual, gay/lesbian, homosexual, prefer not to say (0). Only significant interactions are shown.

p*<.05, *p*<.01, ****p*<.001

Discussion

The results of the current study suggest researchers studying fertility and childbearing should plan for low male participation with a female: male participation ratio of approximately 4:1 even when recruiting from sources known to have a positive attitude to research. A more negative attitude toward participation in fertility and childbearing research was suggested to be the main reason for self-exclusion from this type of research. Factors indicative of interest in or readiness to conceive (e.g., previous birth) were not predictors of intentions to participate over and above the core TPB constructs suggesting that all these factors exert their influence via attitudes, norms or perceived efficacy. However, interest and readiness factors may identify the men ‘missing’ from the evidence base, namely, men not yet at the stage of starting a family for whom this type of research may seem less personally relevant. Future research targeting male preferences, beliefs and values about fertility and childbearing, needs to consider how best to recruit men at all stages of the reproductive life course. Developing methods that are more inclusive could create more favourable attitudes to fertility and childbearing research at all stages therefore helping to achieve that goal. When given the opportunity to partake in fertility and childbearing research fewer men took up the offer than women. The ratio of male to female participants at the initiation of the study was approximately 4:1 with only 22% of the sample being men. The low participation rates were consistent with those of previous research on fertility and childbearing (e.g., Bunting et al., 2013) and other topics (e.g., depression, eating intentions; Siegel et al., 2012; Louis et al., 2009) that show male participation to be far lower than that of women. These findings reinforce previous suggestions that

men are active non-responders choosing to exclude themselves from research (Groves et al., 1992; Rogelberg et al., 2003). When provided with the opportunity to participate, men have lower rates of participation compared to women. Consequently, results suggest that the gender bias that exists in the research on childbearing is likely to be resolved by counter-efforts deployed at the recruitment stage. The present research suggests that attitudes could be the main cause of (non) participation, as has been found for other health-related behaviours (Albarracin et al., 2001). Attitudes express cognitive and affective evaluations about a particular object. Men were shown to have significantly less favourable attitudes than women to research on starting a family (or having another child) in this study. These attitudes predicted whether or not men and women were willing to be contacted about future research, and mediated associations between socio-demographic variables potentially indicative of readiness to conceive (e.g., age, family context) and intentions to participate. Together, these results suggest that men exclude themselves from research because they do not perceive this research to be as valuable or relevant as do women. Future research needs to address why men have more unfavourable attitudes, including the effect of socialization that promotes a gendered view of reproduction (Robinson & Brewster, 2014).

The TPB (Ajzen, 1991) proposes that the factor with the highest relative weight in the intention behaviour relationship should be the target of modification to bring about change in intentions and behaviour. Whether the modification of attitudes would result in a sufficient intention change to elicit actual change in research behaviour needs further investigation. The association between attitudes and intentions was strong accounting for about a third of the variance in intentions. However, only 1% of the variance in actual research behaviour (i.e., uptake of research) was accounted for by intentions. This result is not in line with findings from TPB research in other areas. For example, a meta-analytic review of 72 studies examining TPB and exercise found intentions to account for approximately 27% of the variance in exercise behaviour (Hagger et al., 2002). However, as with the majority of studies examining the adequacy of the TPB in predicting behaviour, physical activity in that meta-analysis was a self-reported measure, whereas in the present study research participation was an objectively measured behaviour. It is well established that the TPB constructs are better at predicting self-reported than actual behaviours (Armitage, 2005). Further, intention does not always translate into behaviour (Barber, 2011; Domar et al., 2010; Scholz et al., 2008). Improving attitudes might therefore be most helpful in generating the intention to engage with research, but other efforts will need to be deployed to support enactment of intentions, as is commonly done in other areas (Gollwitzer, 1999). For example, research on physical exercise and self-regulation following coronary rehabilitation has found that intentions are more likely to result in behavioural enactment if plans to encourage this process are put in place by the individual (Sniehotta et al., 2005).

The distal factors had little influence on intentions beyond that explained by the TPB (Ajzen, 1991). Despite this lack of added value in predicting intentions, they did explain how person and context factors shape attitudes, norms and perceived behavioural control about childbearing research. In the present study, life course factors indicating reproductive readiness (e.g., child desire, previous child) and interest in research were shown to predispose individuals towards favourable attitudes towards participation in fertility and childbearing research. Together, these results reinforce previous suggestions that people are more likely to be motivated to participate in personally relevant research (Groves et al., 1992, Soule et al., 2016). Consequently, the fertility and childbearing research base is likely to be ‘missing’ the attitudes and opinions of individuals for whom childbearing is perceived to be less or not currently relevant. The biological ability to have children and reproductive issues are a consideration for women from a relatively young age and throughout their reproductive careers as a result of menstruation and their primary role in contraceptive use (Marsiglio, 1991). In contrast, for men, reproductive issues may be more dynamic and fragmented. They may simply consider such matters when they are much closer to the time when having children becomes possible (e.g., when they are in a stable relationship) or when fertility and childbearing become personally relevant (e.g., pregnancy, infertility). This is very problematic considering that men are shown to be least knowledgeable about fertility and causes of infertility (Boivin et al., 2018b; Koert et al., 2018) but to gain the most from education (especially at younger ages). In light of these results, the most relevant use of the correlates may be to identify the groups that are omitted from the evidence base used to inform childbearing trends, policy, etc. These ‘missing men’ (and women) could be subjects of future interventions designed to encourage participation in research even when fertility and childbearing are not yet relevant. Research appeals should make salient why the topic is relevant, especially to men.

Study Limitations

Only individuals that expressed an interest in future research (i.e., left their email at T1) could receive the T2 research invitation and have the opportunity to uptake research. This design may have caused two biases. First, those not leaving their email address could potentially have had a change of mind if given the opportunity to participate at T2. Research shows that individuals can take action even if they do not originally intend to do so and that intentions can change as a result of situational and contextual factors (Barber, 2011). As such all the respondents in our study should have been given the opportunity to participate at T2. Second, omitting people that did not leave their emails may have caused a restriction of range in the intention measure. As a result, the correlation obtained between intention and behaviour in the present study may underestimate the true correlation in the sample originally investigated. The sample was additionally biased towards high education and favourable views of research as a result of the university-based recruitment methods. Lack of sample diversity

may mean that the participation rates are not representative of men and women in the general population. Additionally, participant information explicitly stated that the aims of the study were to better understand the participation of men and women in fertility and childbearing research. This could have made men with more interest in the topic more likely to take part in the survey. However, we would argue against this because many findings were consistent with past research on a broader sample (e.g., participation rates, gender differences on attitudes). Replication of the research with a larger non-academic sample that was followed longitudinally would increase the generalizability and reliability of the results.

Another limitation may include the wording used (e.g., childbearing, fertility) when referring to research about starting families because these are gendered words. More detailed exploration of the language of reproduction and how it could exclude men from fertility-related research should be considered. How men construct and assign meaning to childbearing related experiences, how their subjective experiences unfold within a dynamic social context and how these may impact on their behaviour might be critical to participation in research (Marsiglio, 1995).

Conclusion

The results demonstrate the disproportionately low participation rates of men in childbearing research to be a product of self-exclusion from the research which is overall determined by less favourable attitudes towards engaging in this type of research. Modifying attitudes could be the mechanism that would most likely bring about intention (and potentially behaviour) change among those most likely to be missing from childbearing research, namely men not yet at the stage of starting a family. Future research investigating male preferences, beliefs and values about fertility and childbearing needs to consider how to make the research applicable and appealing in order to gain their participation. Increasing male participation in fertility and childbearing research is an essential requirement for contemporary up-to-date knowledge and will also help identify unmet needs in childbearing and fertility research and policy that concern men.

Authors' roles

C.H. and J.B. contributed to the conception and design of the study, the acquisition of data and the analysis and interpretation of data. They drafted all versions of the article and approved the final version for publication.

Conflict of interest

Professor Boivin reports personal fees from Merck KGaA, Darmstadt, Germany, Merck AB an affiliate of Merck KGaA, Darmstadt Germany, Theramex, Ferring Pharmaceuticals A/S, grant from Merck Serono Ltd, outside the submitted work and that she is co-developer of Fertility Quality of Life (FertiQoL) and MediEmo app.

Data availability

The data underlying this article will be shared on reasonable request to the corresponding author.

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