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Gender Stereotypes and Preconception Health: Men's and Women's Expectations of Responsibility and Intentions to Engage in Preventive Behaviors

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Abstract

Introduction As mounting evidence underscores the importance of both men and women taking steps before pregnancy to improve reproductive outcomes, public health priorities are shifting toward a more gender-inclusive program of promoting preconception health (PCH). This study examined whether prescriptive gender stereotypes, defined as men's and women's beliefs about PCH behavioral norms each gender should uphold, were positively associated with intentions to engage in behaviors to protect a future child's health. *Methods* Data came from a June 2017 online survey of 609 U.S. men and women ages 18–44. Two six-item scales of prescriptive same- and opposite-gender stereotypes were used to predict a six-item scale of intentions to engage in six recommended PCH behaviors (i.e., avoiding smoking, secondhand smoke, drinking, exposure to bisphenol A and pesticides, and preventing Zika infection). Multiple linear regression models also adjusted for demographic, socioeconomic, and health characteristics. *Results* Among both male and female respondents, PCH prescriptive gender stereotypes for men were rated significantly lower than those for women. Adjusting for covariates, stronger prescriptive same-gender stereotypes were associated with increased PCH intentions (men: $B = 0.496$, $p < 0.001$; women: $B = 0.486$, $p < 0.001$). Opposite-gender stereotypes were also positively associated with PCH intentions (men: $B = 0.205$, $p < 0.001$; women: $B = 0.235$, $p < 0.001$). Current every day smoking status (men and women), being uninsured (women only), and having children (women only) were also associated with lower PCH intentions. *Conclusion* Prescriptive gender stereotypes may play an important, yet slightly different, role in promoting PCH behavior among men and women.

Keywords Preconception health · Prescriptive gender stereotypes · Gender roles · Norms · Health education and promotion · Smoking · Communication · Responsibility

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Significance

A growing body of evidence links both women's and men's preconception health to negative reproductive outcomes. This study makes several unique contributions to the literature. First, we answer calls for more gender-inclusive PCH research by sampling men. Second, we move beyond examining a single PCH behavior by employing comprehensive measures of behavioral intentions. Our results also support previous assumptions about the relevance of social norms to PCH. Finally, these findings have practical significance for PCH promotion efforts and suggest that targeting expectations of men, which have more room to move in a positive direction, would be particularly promising.

Introduction

Preconception health (PCH) encompasses the health of women and men prior to conceiving a child during their reproductive years. Over the past decade, public health organizations including the Centers for Disease Control and Prevention (CDC) have increasingly prioritized PCH promotion. A growing body of medical evidence links not only women's, but also men's, health behaviors to negative reproductive outcomes. Maternal alcohol and tobacco exposure before and during pregnancy, for instance, increase the likelihood of preterm birth, stillbirth, and cognitive/behavioral problems (Leonardi-Bee et al. 2011; May et al. 2013), while smoking and drinking among men before and during pregnancy negatively impact sperm health, maternal consumption of alcohol and tobacco and fetal/infant health outcomes (i.e., miscarriage, low birth weight; McBride and Johnson 2016; Sharma et al. 2016). Ubiquitous exposure to environmental toxins, such as pesticides, also disrupts hormones responsible for healthy human reproduction (Di Renzo et al. 2015). Because close to half of all pregnancies in the U.S. are unplanned and often go undetected during the most critical period of fetal organ development (Finer and Zolna 2016), even greater attention to wellness preceding pregnancy is needed.

In 2005, after reviewing published research and convening a national summit of subject matter specialists, the CDC developed a strategic plan to improve PCH in the U.S. (Johnson et al. 2006). Among their recommendations, the CDC called for increasing public awareness of the importance of PCH behaviors through campaigns and health messaging, while encouraging both men and women to assume individual responsibility for reproduction. In accordance with well-established theories of health behavior (i.e., the reasoned action approach, née the Theory of Reasoned Action; Fishbein and Ajzen 2015) the recommendations also acknowledge the role played by prevailing social norms in determining PCH-related behaviors. Research is currently limited on people's expectations of who should uphold PCH behavioral norms (i.e., men and women), whether these expectations which we refer to as prescriptive gender stereotypes differ between men and women, and whether they are associated with intentions to engage in PCH behaviors. The objective of this study is to address these knowledge gaps by assessing prescriptive gender stereotypes among U.S. women and men of reproductive age. We also examine potential associations between these stereotypes and a comprehensive measure of PCH-related behavioral intentions. Gaining this knowledge will be important to inform efforts to raise awareness and adoption of PCH behaviors among both groups.

Gender Stereotypes and Health

Compared to sex which traditionally encompasses biological distinctions, gender is a socially constructed concept that confers different norms, prescribed roles and expectations of responsibility upon men and women (Fenstermaker and West 2002). Social structural theory explains how men and women come to occupy certain roles in society based on diverse biological, situational and cultural conditions (Eagly and Wood 1999). Women, for instance, have a greater biological role in childbearing (pregnancy, delivery, lactation) and are also socialized in the U.S. to prioritize motherhood (Mcquillan et al. 2008). Although men contribute less biologically to childbearing, emerging science reveals their increasingly important biological role in preconception (Kotelchuck and Lu 2017), while contemporary expectations of fatherhood have expanded to include greater involvement in reproductive health and childcare (Leavitt 2009). Combined, these biological, situational and cultural conditions can foster *prescriptive gender stereotypes*, or beliefs about gender-specific behavioral norms that society expects men and women to uphold (Prentice and Carranza 2002). Beliefs about what constitutes acceptable behavior can be held about one's own gender (i.e., *prescriptive same-gender stereotypes*) or about the other gender (i.e., *prescriptive opposite-gender stereotypes*). For instance, in the context of PCH, a man may believe that women should quit smoking prior to conception (*PCH prescriptive opposite-gender stereotype*) while also considering the behavior less critical for men (*PCH prescriptive same-gender stereotype*).

PCH-related studies that include men are exceedingly rare; however, there has been some inclusive work documenting important sex and gender differences in terms of information exposure and knowledge. Content analyses of websites and local-, state-, and federal-level education materials have revealed a focus primarily on women,

excluding men as an integral part of healthy reproduction (Levis and Westbrook 2013; Thompson et al. 2017). While both men and women report limited encounters with PCH messages from healthcare providers (Frey et al. 2012; Frey and Files 2006), men also receive significantly less preconception care in publicly funded clinics (Robbins et al. 2016). Research shows nearly all women and men recognize the importance of optimizing pre-pregnancy health (Frey et al. 2012; Frey and Files 2006), though awareness and knowledge of specific health behaviors is limited, with women tending to score slightly higher than men on comparative assessments (Mitchell et al. 2012).

The present study is a direct response to calls for more gender-inclusive PCH research assessing a wide variety of PCH behaviors and intentions (Kotelchuck and Lu 2017; Toivonen et al. 2017). Because of the relative novelty of gender-focused investigations related to PCH and the somewhat mixed and limited body of evidence, we first examine whether there are any significant differences between men and women in their intentions and prescriptive gender stereotypes as they relate to taking steps to protect the health of a future child:

RQ1: Are there differences between men's and women's *PCH behavioral intentions*?

RQ2: Are there differences between men's and women's *PCH prescriptive same-gender stereotypes?*

According to social structural theory (Eagly and Wood 1999), the communication of gender-stereotypic expectations through various forms of social interaction (e.g., family, peers, the media) can lead people to internalize certain expectations and in turn, adopt behaviors in line with successful role performance. Studies have documented relationships between conformity to traditional, socially prescribed gender roles and substance use, such that masculine attitudes and beliefs among men (e.g., dominance) were positively associated with tobacco and alcohol consumption while women's conformity to feminine norms (e.g., investment in appearance, being a good mother) were negatively associated with those behaviors (Bottorff et al. 2014; Sánchez–López et al. 2012).

Some evidence suggests that gender-role attitudes are fluid and relational in the transition to parenthood suggesting that new attitudes and roles may be adopted that influence relational, childcare and health behaviors, particularly among men (Genesoni and Tallandini 2009). Based on established theories of health behavior and emerging research related to gender roles specifically, we expect that prescriptive same-gender expectations will be positively associated with preconception health-related behavioral intentions, such that expectations of one's own gender in protecting the health of a future child will align with individual behavioral intentions:

H1a: Men's *prescriptive same-gender stereotypes* will be positively associated with *PCH behavioral intentions*.

H1b: Women's *prescriptive same-gender stereotypes* will be positively associated with *PCH behavioral intentions*.

Less is known about opposite-gender expectations and how they might relate to one's own behavioral intentions. While it is possible that expecting one's (future) partner to participate in PCH could motivate an individual to do the same, it's also possible that it could lead to a diffusion of responsibility that hinders action. Therefore, we also ask the following:

RQ3: Are there differences between men's and women's *prescriptive opposite-gender stereotypes?*

RQ4a: Are men's *prescriptive same-gender stereotypes* higher or lower than their *prescriptive opposite-gender stereotypes*?

RQ4b: Are women's *prescriptive same-gender stereotypes* higher or lower than their *prescriptive opposite-gender stereotypes*?

RQ5a: Are men's *prescriptive opposite-gender stereotypes* associated with *PCH behavioral intentions*?

RQ5b: Are women's *prescriptive opposite-gender stereotypes* associated with *PCH behavioral intentions*?

Methods

Study Sample

The study sample consisted of members of a panel maintained by Survey Sampling International (SSI). SSI uses a multi-sourced recruitment approach, building their diverse opt-in panel of U.S. adults agreeing to complete online surveys through banner ads, pop ups, television advertising and other offline techniques. Data were collected through an online questionnaire programmed with Qualtrics software (Qualtrics, Provo, UT). The study procedure was approved by Northeastern University's institutional review board.

Eligibility requirements were adapted from similar studies of preconception health using data from the Behavioral Risk Factor Surveillance System (BRFSS; Mitra et al. 2016) and included heterosexual men and women of childbearing age (18–44 years) who reported being both physically able to and interested in having a child in the next 2 years.

In June 2017, a generic email invitation was sent to SSI panelists between the ages of 18–44 (n = 34,081). We established a minimum quota of 250 male and 250 female respondents based on project budget and similar sample sizes observed in prior PCH studies (i.e., Delgado 2008; Frey and Files 2006). Among those invited, 1346 panelists began the survey. Of the 773 panelists who met our eligibility criteria, 679 (87.8%) completed the survey. Using predefined cut-offs for completion time, we filtered out certain

participants who did not complete the survey in a timely manner (i.e., within two standard deviations from the mean); therefore, our final analyzed sample was 609 with more women (n = 340, 56%) than men (n = 269, 44%).

Measures

At the start of the survey, preconception health was defined as "focusing on taking steps now—before a pregnancy—to protect the health of a baby in the future."

Preconception Health Intention

Measures of intention to engage in preconception health-related behaviors were developed by the study team and informed by the Reasoned Action Approach (Fishbein and Ajzen 2015). We included six survey items that asked respondents the extent to which they agreed with the following statement, "In order to protect the health of my own future child or children, I intend to…" The items were adapted from online PCH promotion materials developed by the Centers for Disease Control and Prevention (2017b) with a focus on six behaviors relevant to both men and women: (1) avoid smoking cigarettes, (2) avoid secondhand smoke, (3) avoid drinking too much alcohol (defined as 5 or more drinks in about 2 h for men, and 4 or more for women), (4) prevent Zika infection, and avoid exposure to (5) bisphenol A (also known as BPA) and (6) pesticides. Each item was assessed on a 5-point scale (1 = *strongly disagree*; 5 = *strongly agree*) and combined into a scale for analysis (Cronbach's α = 0.87; Fishbein and Ajzen 2015). Higher scores reflect greater PCH intention.

Prescriptive Same- and Opposite-Gender Stereotypes for Preconception Health

The study adapted measures of prescriptive same- and opposite-gender stereotypes for preconception health from prior research (Fishbein and Ajzen 2015; Prentice and Carranza 2002). First, respondents read a statement explaining that questions pertained to their "expectations of [men/women] generally to protect the health of a future child. We'd like you to think about whether [men/women] are responsible for engaging in certain activities in the year before a pregnancy. Please tell us how much you agree with the follow statements about [men's/women's] preconception health." Then, respondents indicated the extent to which they agreed or disagreed on a 5-point scale (1 = *strongly disagree*; 5 = *strongly agree*) with statements regarding their role expectations of their same gender group and the opposite gender group (e.g., "Men should…") for the same six PCH behaviors described above (gender groups and behaviors were randomly ordered).

Scores on the six items pertaining to same-gender expectations (e.g., men's responses to questions about what men should do) were averaged into separate scales for men (α = 0.79) and for women (α = 0.87). Scores on the six items pertaining to opposite-gender expectations (e.g., men's responses to questions about what women should do) were averaged into separate scales for men (α = 0.87) and for women (α = 0.83). Higher scores reflect stronger prescriptive gender stereotypes and perceived responsibility for preconception health.

Covariates

Covariates represented factors known to influence PCH-related beliefs and behaviors and qualities that may impact access to and utilization of preconception care (Delissaint and McKyer 2011). Predisposing factors represent demographic and socio-structural characteristics including age, race (White, African American, Asian, other), relationship status (unpartnered, partnered), and parental status (already having children or not). Enabling factors include resources such as highest level of education (some/high school degree, some college, bachelor's degree, postgraduate work), health insurance status (covered by public, private, or other insurance or not; CDC 2017a), and income (< $30,000, $30,000–49,999, >=$50,000). Finally, need factors encompass an individual's health behaviors and beliefs, which in our survey were captured by self-reported health status (poor/fair, good, very good, excellent; CDC 2017a) and smoking status (current every day smoker, current some days smoker, former smoker, never smoker; CDC 2013–2014).

Statistical Analysis

All analyses were conducted in August 2017 using IBM SPSS Statistics 24. First, we performed descriptive analyses of the sample characteristics and assessed demographic differences between men and women in the sample using Chi-square statistics. Because distributions for intentions and prescriptive gender stereotypes were non-normal, we compared men's and women's responses on these scales using the non-parametric Mann–Whitney, Sign and Wilcoxon signed-rank tests. Next, we analyzed bivariate correlations (Spearman's rho) between the scales for PCH behavioral intention and same- and opposite-gender stereotypes. Before we fit separate multiple regression models for men and women (H1a/b, RQ5a/b), diagnostics ensured our data did not violate linear regression assumptions (e.g., normally distributed residuals, no extreme outliers, no multicollinearity between predictors). For each gender, PCH intention was regressed against same-gender role expectations, opposite-gender role expectations and a series of covariates.

Missing data for women and men totaled 17.6% and 11.5%, respectively. We recognized that our data were not missing completely at random (MCAR), so we performed a sensitivity analysis to investigate whether the results of analyses would differ if individuals with missing values on certain sociodemographic questions (i.e., race, partner status, education, and income) were not excluded by listwise deletion. Using the missing-indicator method (Jones 1996), missing values were coded and included as dummy variables in all models. We found the pattern of results were robust across missing value analyses. Given the preference for complete-case analysis in nonrandomized studies, we report models using listwise deletion here.

Results

Sample characteristics are reported in Table 1. Women were similar to men on most demographic dimensions examined, although men tended to be slightly older, were less likely to have children and had higher levels of both education and income.

Table 2 provides descriptive statistics for all scale items included in the analytic models. Intention was non-normally distributed for both men (skewness = − 2.09, and kurtosis = 5.85) and women (skewness = − 2.10 and kurtosis = 5.16). A Mann–Whitney test indicated that median PCH intention was significantly higher among women (4.83) than among men (4.67), $U = 39{,}875$, $z = -2.759$, $p = 0.006$ (Research Question 1).

Prescriptive same-gender stereotypes were also high for both men and women. These expectations were non-normally distributed for both men (skewness = − 1.35 and kurtosis = 2.30) and women (skewness = − 2.55 and kurtosis = 8.34). A Mann–Whitney test indicated that median same-gender stereotypes were significantly higher among women (4.67) than among men (4.33), $U = 33{,}053$, $z = -5.960$, $p < 0.001$ (Research Question 2).

Prescriptive opposite-gender stereotypes were also high for both men and women. Such expectations were non-normally distributed for both men (skewness = − 2.39 and kurtosis = 7.15) and women (skewness = − 1.41 and kurtosis = 2.34). A Mann–Whitney test indicated that median opposite-gender stereotypes were significantly lower among women (4.33) than among men (4.67), $U = 34{,}286$, $z = -5.179$, $p < 0.001$ (Research Question 3).

Of the 267 men with complete same- and opposite-gender stereotype measures, 80 attributed equal responsibility to both genders while 141 attributed more responsibility to women. Only 46 attributed more responsibility to men. The difference scores were asymmetrically distributed, as assessed by a histogram, so an exact sign test with continuity correction was used to assess differences. Results showed men had significantly higher opposite-gender stereotypes of women (4.67) than same-gender stereotypes of men (4.33), $z = -6.874$, $p < 0.001$ (Research Question 4a).

Of the 339 women with complete same- and opposite-gender stereotype measures, 100 attributed equal responsibility to both genders while 198 attributed more responsibility to women. Only 41 attributed more responsibility to men. The difference scores were symmetrically distributed, as assessed by a histogram. A Wilcoxon signed-rank determined that women had significantly lower median opposite-gender stereotypes of men (4.33) than same-gender stereotypes of women (4.67), $z = -10.256$, $p < 0.001$ (Research Question 4b).

Examination of scatterplots indicated positive, linear associations between PCH prescriptive same-gender stereotypes and PCH intention, which were confirmed in bivariate analyses for men (Spearman's rho = 0.613, $p < .001$) and women (Spearman's rho = 0.659, $p < 0.001$). The same was true for PCH prescriptive opposite-gender stereotypes and PCH intention in bivariate analyses for men (Spearman's rho = 0.579, $p < 0.001$) and women (Spearman's rho = 0.593, $p < 0.001$).

Table 3 shows the separate multiple regression analyses for male and female respondents predicting PCH intentions with PCH prescriptive same-gender stereotypes in support of Hypothesis 1. Adjusting for covariates, same-gender stereotypes were significantly associated with PCH intentions for both men and women, such that respondents who reported stronger prescriptive stereotypes for their own gender also had higher intentions to engage in PCH behaviors.

Analyses also revealed significant positive associations between opposite-gender stereotypes and PCH intentions for both men and women (Research Questions 5a/b), such that respondents who reported stronger PCH prescriptive stereotypes for the opposite gender also had higher intentions to engage in PCH behaviors. Current every day smokers were less likely to intend to engage in preventive behaviors to protect the health of a future child. Women who already had a child or were uninsured at the time of the survey were also less likely to intend to engage in preventive behaviors for a future child.

Discussion

As growing medical evidence underscores the importance of taking steps before a pregnancy to improve reproductive outcomes, public health priorities have shifted toward a more inclusive program of promoting preconception health. In this study, we address several existing gaps in PCH-related research by including men, assessing a wide variety of PCH behaviors, considering behavioral intentions and taking stereotypical gender norms into account (Toivonen et al.

Table 1 Sample characteristics

	Full sample		Men		Women	
	n	%	*n*	%	*n*	%
No. of participants	609		269	44.2	340	55.8
Predisposing factors						
Age in years[a*]	609	30.06 (5.16)	269	31.19 (5.41)	340	29.16 (4.77)
Race						
White	426	73.3	190	74.2	236	72.6
African American	55	9.5	22	8.6	33	10.2
Asian	48	7.9	24	9.4	22	6.8
Other	54	9.3	20	7.8	34	10.5
Missing	28		13		15	
Relationship status						
Unpartnered (divorced, unmarried)	133	23.3	61	24.6	72	22.4
Partnered (married, domestic partner)	437	71.8	187	75.4	250	77.6
Missing	39		21		18	
Parental status*						
Already have children	450	73.9	184	68.4	266	78.2
No children yet	159	26.1	85	31.6	74	21.8
Enabling factors						
Education*						
Completed some/graduated high school (HS)	92	16.0	39	15.5	53	16.5
Some college	164	28.6	54	21.4	110	34.2
Completed bachelor's degree	205	35.7	96	38.1	109	33.9
Postgraduate work[b]	113	19.7	63	25.0	50	15.5
Missing	35		17		18	
Health insurance status						
Uninsured	94	15.4	46	17.1	48	14.1
Insured (public, private or other)[b]	515	84.6	223	82.9	292	85.9
Income*						
< $30,000	110	19.9	49	19.8	61	20.0
$30,000–$49,999	121	21.9	41	16.6	80	26.2
≥ $50,000[b]	321	58.2	157	63.6	164	53.8
Missing	57		22		35	
Need factors						
Health status						
Poor/fair	44	7.2	21	7.8	23	6.8
Good	199	32.7	80	29.7	119	35.0
Very good	263	43.2	115	42.8	148	43.5
Excellent[b]	103	16.9	53	19.7	50	14.7
Smoking status						
Current every day smoker	59	9.7	32	11.9	27	7.9
Current some days smoker	46	7.6	22	8.2	24	7.1
Former smoker	84	13.8	40	14.9	44	12.9
Never smoker[b]	420	69.0	175	65.1	245	72.1

% % of non-missing

[a]Mean (SD)

[b]Used as reference category when dummy variables were created

*p values < 0.05 are derived from Chi-square statistics to assess differences across gender

Table 2 Descriptive statistics for behavioral intentions and prescriptive gender stereotypes

	Men			Women			
	n	Mean (SD)	Median	n	Mean (SD)	Median	p
Combined scale of behavioral intentions	268	4.47 (0.69)	4.67	340	4.57 (0.66)	4.83	0.006[a]
Smoking cigarettes	268	4.70 (0.75)	5.00	340	4.72 (0.73)	5.00	
Secondhand smoke	269	4.55 (0.85)	5.00	340	4.62 (0.80)	5.00	
Zika infection	269	4.53 (0.88)	5.00	340	4.63 (0.82)	5.00	
Drinking too much alcohol	269	4.43 (0.94)	5.00	340	4.67 (0.82)	5.00	
Bisphenol A (BPA) exposure	269	4.22 (1.01)	5.00	340	4.29 (1.01)	5.00	
Pesticide exposure	269	4.41 (0.90)	5.00	340	4.48 (0.83)	5.00	
Combined scale of prescriptive same-gender stereotypes	269	4.25 (0.71)[b]	4.33	340	4.51 (0.67)[c]	4.67	< 0.001[a]
Smoking cigarettes	269	4.54 (0.93)	5.00	340	4.76 (0.71)	5.00	
Secondhand smoke	269	4.33 (1.00)	5.00	340	4.61 (0.80)	5.00	
Zika infection	269	4.40 (0.99)	5.00	340	4.60 (0.83)	5.00	
Drinking too much alcohol	269	4.13 (1.07)	4.00	340	4.58 (0.89)	5.00	
Bisphenol A (BPA) exposure	269	3.89 (1.13)	4.00	340	4.11 (1.02)	4.00	
Pesticide exposure	269	4.20 (0.97)	4.00	340	4.42 (0.90)	5.00	
Combined scale of prescriptive opposite-gender stereotypes	267	4.46 (0.71)[b]	4.67	339	4.21 (0.76)[c]	4.33	< 0.001[a]
Smoking cigarettes	267	4.70 (0.76)	5.00	340	4.43 (0.99)	5.00	
Secondhand smoke	269	4.58 (0.87)	5.00	340	4.19 (1.06)	5.00	
Zika infection	269	4.49 (0.95)	5.00	340	4.47 (0.90)	5.00	
Drinking too much alcohol	268	4.54 (0.88)	5.00	340	4.18 (1.07)	5.00	
Bisphenol A (BPA) exposure	269	4.07 (1.05)	4.00	339	3.86 (1.12)	4.00	
Pesticide exposure	269	4.36 (0.96)	5.00	340	4.11 (1.03)	4.00	

All items were measured on a scale from 1 = *strongly disagree* to 5 =*strongly agree*

[a]Mann-Whitney test

[b]Sign test, $p < 0.001$

[c]Wilcoxon signed-rank test, $p < 0.001$

2017). The CDC suggests a relationship exists between social norms and PCH-related health behaviors, but until this study, the connection between prescriptive gender stereotypes and PCH-related intentions was unknown.

Our results showed that both women and men strongly intend to and feel their respective genders should take steps to protect the health of a future child, and that prescriptive stereotypes held for both same- and opposite gender groups are positively associated with intentions, even after adjusting for a series of covariates. Yet, we also observed some key between- and within-gender differences. First, stereotypical beliefs that women should uphold norms associated with PCH behaviors were significantly higher than beliefs about what men should do, among both female and male respondents. This could be partly explained by women's greater biological role in childbearing and socially prioritized roles as mothers (Mcquillan et al. 2008). Prior research showing that PCH education and healthcare focuses primarily on women could also contribute to these observed differences. Lower expectations of men for engaging in PCH-related behaviors presents an opportunity to 'move' both groups toward attributing greater importance and responsibility to men's role in preconception health. Sharing evidence of the link between men's PCH behaviors and reproductive outcomes could help distribute responsibility more equitably across genders.

Among women, we also found that current every day smokers, those without health insurance, and those with children were less likely to intend to engage in PCH behaviors, consistent with findings from prior research of factors related to PCH engagement (Delissaint and McKyer 2011). Women without health insurance likely lack proper access to preconception information and care and are then less able or motivated to engage in PCH behaviors. Also, women who have already successfully reproduced may either have decreased risk perceptions associated with maternal, fetal and infant health, or are too preoccupied with motherhood to adopt new or sustain prior PCH behaviors.

A qualitative look at both the intention and prescriptive stereotype scales showed that both women and men prioritized the avoidance of smoking cigarettes among the various steps that could be taken to protect the health of a future child, which may reflect the general denormalization of tobacco use in the U.S. The observed relationship between current every day smoking status and PCH intention among

Table 3 Multiple regression analysis predicting preconception health intentions with prescriptive gender stereotypes

	Men ($n=236$)		Women ($n=298$)	
	B	(95% CI)	B	(95% CI)
Prescriptive same-gender stereotypes	0.496***	(0.382, 0.610)	0.486***	(0.363, 0.608)
Prescriptive opposite-gender stereotypes	0.205**	(0.085, 0.325)	0.235***	(0.126, 0.345)
Predisposing factors				
Age	0.008	(−0.006, 0.022)	−0.002	(−0.014, 0.010)
Race/ethnicity				
African American	0.108	(−0.150, 0.367)	−0.067	(−0.249, 0.115)
Asian	−0.002	(−0.239, 0.235)	0.064	(−0.155, 0.283)
Other	0.168	(−0.112, 0.449)	−0.078	(−0.260, 0.105)
White (ref.)	–	–	–	–
Relationship status				
Unpartnered	0.002	(−0.177, 0.182)	−0.082	(−0.228, 0.064)
Partnered (ref.)	–	–	–	–
Parental status				
Already have children	−0.040	(−0.201, 0.121)	−0.169*	(−0.308, −0.031)
No children yet (ref.)	–	–	–	–
Enabling factors				
Education				
High school	0.178	(−0.082, 0.438)	−0.004	(−0.208, 0.200)
Some college	0.082	(−0.132, 0.297)	0.054	(−0.126, 0.233)
Bachelor's degree	0.083	(−0.088, 0.255)	−0.086	(−0.254, 0.082)
Postgraduate (ref.)	–	–	–	–
Insurance status				
Uninsured	−0.067	(−0.268, 0.135)	−0.175*	(−0.330, −0.021)
Insured (ref.)	–	–	–	–
Income				
< $30,000	−0.136	(−0.335, 0.064)	0.050	(−0.096, 0.196)
$30,000–$49,999	0.063	(−0.135, 0.261)	0.049	(−0.082, 0.181)
≥ $50,000 (ref.)	–	–	–	–
Need factors				
Health Status				
Poor/fair	0.066	(−0.230, 0.362)	−0.041	(−0.303, 0.221)
Good	0.027	(−0.178, 0.233)	−0.064	(−0.242, 0.113)
Very good	−0.011	(−0.211, 0.189)	−0.034	(−0.204, 0.136)
Excellent (ref.)	–	–	–	–
Smoking status				
Current every day smoker	−0.331**	(−0.551, −0.111)	−0.289*	(−0.513, −0.064)
Current some days smoker	−0.165	(−0.407, 0.128)	−0.098	(−0.315, 0.119)
Former smoker	−0.049	(−0.233, 0.163)	0.105	(−0.056, 0.267)
Never smoker (ref.)	–	–	–	–
Constant	1.199		1.659	
R-squared	0.497		0.565	

ref. reference group. Data was collected in June 2017

*$p<0.05$; **$p<0.01$; ***$p<0.001$

men was novel in this population of prospective fathers, but in line with findings from prior studies demonstrating the power of descriptive social norms in directing quit attempts (Dohnke et al. 2011).

Our results can inform efforts to promote PCH and reproductive awareness. Targeting and carefully framing both male and female prescriptive stereotypes may be an effective way to bolster women's currently limited

engagement with preconception care while also helping overcome the general exclusion of men from reproductive health. Reviews of interventions aimed to reinforce or change gender norms and stereotypes have made several recommendations for taking a gendered approach (Lewis et al. 2013; Mitchell and Verbiest 2013).

Our results align with these prior recommendations. First, health communicators should promote gender equity and healthy gender norms, roles and relations by acknowledging positive representations of both men and women and countering problematic gender stereotypes, like those perpetuated by the pro and anti-tobacco industries (e.g., links between femininity and sexual attractiveness or independence, and masculinity and 'cold turkey' quitting methods; Bottorff et al. 2014). Because PCH is relevant for a significant portion of one's life, a real risk of 'responsibility explosion' also exists (Bonte et al. 2014), particularly among women whose stereotypes more strongly align with intentions in our study. Communicators, especially healthcare providers considered a particularly important information resource by prospective parents, must carefully manage this so as not to stigmatize or overburden their target audience with feelings of self-blame or guilt (Guttman and Ressler 2001).

Second, health communicators should also consider the intersection of gender and other social influences on health behavior (i.e., relationship status, communication of opposite-gender stereotypes). Even though relationship status was not a significant predictor in our models, some research has found that couples are particularly receptive to PCH social marketing approaches (Lewis et al. 2013). This could be partly explained by research demonstrating that the communication of a mother's paternal role expectations, also known as maternal gatekeeping, can influence actual levels of paternal involvement (McBride et al. 2005). Expectations and support can also flow in the opposite direction, as evidenced by studies showing the ability of paternal involvement during pregnancy to decrease maternal smoking (Martin et al. 2007). Leveraging these relationship dynamics requires care, particularly in the context of tobacco control, but offers a promising avenue for effecting change in light of our opposite-gender findings. One study has shown that couples planning to have children believe all messages should focus on having a healthy baby and family, but those targeting men should specifically emphasize support and communication (Lewis et al. 2013).

Examining possible antecedents of PCH prescriptive gender stereotypes (i.e., age, relationship status, parental status) was beyond the scope of the current study; however, future research should explore the ways in which men and women are socialized into having certain expectations for both men's and women's health behaviors prior to pregnancy and whether making those same- and opposite-gender stereotypes salient has a measurable impact on cognitive and behavioral outcomes.

Limitations

This study has several limitations. First, the use of an online panel in which participants self-selected into the study limits the generalizability of the results to the larger population. We further limited participation to heterosexual prospective parents (those able to and interested in having a child in the next 2 years), which only accounts for a portion of the target PCH population. The cross-sectional nature of the data is also vulnerable to risks of reverse causation and unmeasured confounders, limiting our ability to make causal claims. Our survey was limited to six PCH behaviors that were gaining research and media attention at the time of the study (i.e., Zika virus, alcohol) to minimize respondent burden. Future research should assess whether these findings would be replicated when considering other, more complex PCH behaviors, such as maintaining a healthy weight through diet and exercise. Finally, our measures of prescriptive gender stereotypes were broadly conceived and did not capture an individual's conformity to specific masculine or feminine gender role attitudes or beliefs. Future research should assess beliefs about both traditional and modern gender stereotypes in the context of reproduction and parenting to provide a more detailed representation of the psychological determinants of PCH intentions.

Despite these limitations, this study provides previously unavailable evidence supporting assumptions about the relevance of social norms for preconception health outcomes. For both men and women, prescriptive same- and opposite-gender stereotypes for PCH play an important role in one's intention to engage in PCH behaviors; however, significantly more responsibility is expected of women by both genders. As such, gender stereotypes serve as a promising avenue for further study and a potentially useful target in promotional PCH messaging and interventions.

References

Bonte, P., Pennings, G., & Sterckx, S. (2014). Is there a moral obligation to conceive children under the best possible conditions? A preliminary framework for identifying the preconception responsibilities of potential parents. *BMC Medical Ethics, 15*(1), 5. https://doi.org/10.1186/1472-6939-15-5.

Bottorff, J. L., Haines-Saah, R., Kelly, M. T., Oliffe, J. L., Torchalla, I., Poole, N., Greaves, L., Robinson, C. A., Ensom, M. H., Okoli, C. T., & Phillips, J. C. (2014). Gender, smoking and tobacco reduction and cessation: a scoping review. *International Journal for Equity in Health, 13*(1), 114. https://doi.org/10.1186/s12939-014-0114-2.

Centers for Disease Control and Prevention. (2013–2014). *National Adult Tobacco Survey (NATS) Questionnare*. Atlanta: Office on

Smoking and Health, National Center for Chronic Disease Prevention and Health Promotion.
Centers for Disease Control and Prevention. (2017a). *Behavioral Risk Factor Surveillance System Survey Questionnaire*. Atlanta: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention.
Centers for Disease Control and Prevention. (2017b, February 13, 2017). *Preconception Health and Health Care*. Retrieved from https://www.cdc.gov/preconception/index.html.
Delgado, C. E. F. (2008). Undergraduate student awareness of issues related to preconception health and pregnancy. *Maternal and Child Health Journal, 12*(6), 774–782. https://doi.org/10.1007/s10995-007-0300-6.
Delissaint, D., & McKyer, E. L. (2011). A systematic review of factors utilized in preconception health behavior research. *Health Education & Behavior, 38*(6), 603–616. https://doi.org/10.1177/1090198110389709.
Di Renzo, G. C., Conry, J. A., Blake, J., DeFrancesco, M. S., DeNicola, N., Martin, J. N., McCue, K. A., Richmond, D., Shah, A., Sutton, P., Woodruff, T. J., & Giudice, L. C. (2015). International Federation of Gynecology and Obstetrics opinion on reproductive health impacts of exposure to toxic environmental chemicals. *International Journal of Gynecology & Obstetrics, 131*(3), 219–225. https://doi.org/10.1016/j.ijgo.2015.09.002.
Dohnke, B., Weiss-Gerlach, E., & Spies, C. D. (2011). Social influences on the motivation to quit smoking: Main and moderating effects of social norms. *Addictive Behaviors, 36*(4), 286–293. https://doi.org/10.1016/j.addbeh.2010.11.001.
Eagly, A. H., & Wood, W. (1999). The origins of sex differences in human behavior: Evolved dispositions versus social roles. *American Psychologist, 54*(6), 408–423. https://doi.org/10.1037/0003-066X.54.6.408.
Fenstermaker, S., & West, C. (2002). *Doing gender, doing difference: Inequality, power and institutional change*. New York: Routledge.
Finer, L. B., & Zolna, M. R. (2016). Declines in unintended pregnancy in the United States, 2008–2011. *New England Journal of Medicine, 374*(9), 843–852. https://doi.org/10.1056/NEJMsa1506575.
Fishbein, M., & Ajzen, I. (2015). *Predicting and changing behavior: The reasoned action approach*. New York: Routledge.
Frey, K. A., Engle, R., & Noble, B. (2012). Preconception healthcare: What do men know and believe? *Journal of Men's Health, 9*(1), 25–35. https://doi.org/10.1016/j.jomh.2011.11.001.
Frey, K. A., & Files, J. A. (2006). Preconception healthcare: What women know and believe. *Maternal and Child Health Journal, 10*(5 Suppl), 73–77. https://doi.org/10.1007/s10995-006-0110-2.
Genesoni, L., & Tallandini, M. A. (2009). Men's psychological transition to fatherhood: An analysis of the literature, 1989–2008. *Birth, 36*(4), 305–318. https://doi.org/10.1111/j.1523-536X.2009.00358.x.
Guttman, N., & Ressler, W. H. (2001). On being responsible: Ethical issues in appeals to personal responsibility in health campaigns. *Journal of Health Communication, 6*(2), 117–136. https://doi.org/10.1080/10810730116864.
Johnson, K., Posner, S. F., Biermann, J., Cordero, J. F., Atrash, H. K., Parker, C. S., Boulet, S., & Curtis, M. G. (2006). Recommendations to improve preconception health and health care—United States. A report of the CDC/ATSDR Preconception Care Work Group and the Select Panel on Preconception Care. *MMWR Recommendations and Reports, 55*(Rr-6), 1–23.
Jones, M. P. (1996). Indicator and stratification methods for missing explanatory variables in multiple linear regression. *Journal of the American Statistical Association, 91*(433), 222–230. https://doi.org/10.2307/2291399.
Kotelchuck, M., & Lu, M. (2017). Father's role in preconception health. *Maternal and Child Health Journal, 21*(11), 2025–2039. https://doi.org/10.1007/s10995-017-2370-4.
Leavitt, J. W. (2009). *Make room for daddy: The journey from waiting room to birthing room*. Chapel Hill: The University of North Carolina Press.
Leonardi-Bee, J., Britton, J., & Venn, A. (2011). Secondhand smoke and adverse fetal outcomes in nonsmoking pregnant women: A meta-analysis. *Pediatrics, 127*(4), 734–741. https://doi.org/10.1542/peds.2010-3041.
Levis, D. M., & Westbrook, K. (2013). A content analysis of preconception health education materials: Characteristics, strategies, and clinical-behavioral components. *American Journal of Health Promotion, 27*(3_suppl), S36–S42. https://doi.org/10.4278/ajhp.120113-QUAL-19.
Lewis, M. A., Mitchell, E. W., Levis, D. M., Isenberg, K., & Kish-Doto, J. (2013). Couples' notions about preconception health: Implications for framing social marketing plans. *American Journal of Health Promotion, 27*(3), S20–S27. https://doi.org/10.4278/ajhp.120127-QUAL-65.
Martin, L. T., McNamara, M. J., Milot, A. S., Halle, T., & Hair, E. C. (2007). The effects of father involvement during pregnancy on receipt of prenatal care and maternal smoking. *Maternal and Child Health Journal, 11*(6), 595–602. https://doi.org/10.1007/s10995-007-0209-0.
May, P. A., Blankenship, J., Marais, A.-S., Gossage, J. P., Kalberg, W. O., Joubert, B., Cloete, M., Barnard, R., De Vries, M., Hasken, J., Robinson, L. K., & Seedat, S. (2013). Maternal alcohol consumption producing fetal alcohol spectrum disorders (FASD): Quantity, frequency, and timing of drinking. *Drug and Alcohol Dependence, 133*(2), 502–512. https://doi.org/10.1016/j.drugalcdep.2013.07.013.
McBride, B. A., Brown, G. L., Bost, K. K., Shin, N., Vaughn, B., & Korth, B. (2005). Paternal identity, maternal gatekeeping, and father involvement. *Family Relations, 54*(3), 360–372. https://doi.org/10.1111/j.1741-3729.2005.00323.x.
McBride, N., & Johnson, S. (2016). Fathers' role in alcohol-exposed pregnancies. *American Journal of Preventive Medicine, 51*(2), 240–248. https://doi.org/10.1016/j.amepre.2016.02.009.
Mcquillan, J., Greil, A. L., Shreffler, K. M., & Tichenor, V. (2008). The importance of motherhood among women in the contemporary United States. *Gender & Society, 22*(4), 477–496. https://doi.org/10.1177/0891243208319359.
Mitchell, E. W., Levis, D. M., & Prue, C. E. (2012). Preconception health: Awareness, planning, and communication among a sample of U.S. men and women. *Maternal and Child Health Journal, 16*(1), 31–39. https://doi.org/10.1007/s10995-010-0663-y.
Mitchell, E. W., & Verbiest, S. (2013). Effective strategies for promoting preconception health—From research to practice. *American Journal of Health Promotion, 27*(3), S1–S3. https://doi.org/10.4278/ajhp/27.3.c1.
Mitra, M., Clements, K. M., Zhang, J., & Smith, L. D. (2016). Disparities in adverse preconception risk factors between women with and without disabilities. *Maternal and Child Health Journal, 20*(3), 507–515. https://doi.org/10.1007/s10995-015-1848-1.
Prentice, D. A., & Carranza, E. (2002). What women and men should be, shouldn't be, are allowed to be, and don't have to be: The contents of prescriptive gender stereotypes. *Psychology of Women Quarterly, 26*(4), 269–281. https://doi.org/10.1111/1471-6402.t01-1-00066.
Robbins, C. L., Gavin, L., Zapata, L. B., Carter, M. W., Lachance, C., Mautone-Smith, N., & Moskosky, S. B. (2016). Preconception care in publicly funded U.S. clinics that provide family planning services. *American Journal of Preventive Medicine, 51*(3), 336–343. https://doi.org/10.1016/j.amepre.2016.02.013.
Sánchez–López, M. d. Cuellar–Flores, P., I., & Dresch, V. (2012). The impact of gender roles on health. *Women & Health, 52*(2), 182–196. https://doi.org/10.1080/03630242.2011.652352.

Sharma, R., Harlev, A., Agarwal, A., & Esteves, S. C. (2016). Cigarette smoking and semen quality: A new meta-analysis examining the effect of the 2010 World Health Organization laboratory methods for the examination of human semen. *European Urology, 70*(4), 635–645. https://doi.org/10.1016/j.eururo.2016.04.010.

Thompson, E. L., Vazquez-Otero, C., Vamos, C. A., Marhefka, S. L., Kline, N. S., & Daley, E. M. (2017). Rethinking preconception care: A critical, women's health perspective. *Maternal and Child Health Journal, 21*(5), 1147–1155. https://doi.org/10.1007/s10995-016-2213-8.

Toivonen, K. I., Oinonen, K. A., & Duchene, K. M. (2017). Preconception health behaviours: A scoping review. *Preventive Medicine, 96(Supplement C)*, 1–15. https://doi.org/10.1016/j.ypmed.2016.11.022.