Family Practice, 2017, 1–10
doi:10.1093/fampra/cmx086

OXFORD

Review

A systematic review of the effect of reproductive intention screening in primary care settings on reproductive health outcomes

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Abstract

Purpose. No recommendations exist for routine reproductive intention screening in primary care. The objective of this systematic review is to assess the effect of reproductive intention screening in primary care on reproductive health outcomes (PROSPERO CRD42015019726).

Methods. We performed a systematic search in Ovid Medline, PubMed, CINAHL, Embase, CDR/DARE databases, Web of Science, ISRCTN registry, Clinicaltrials.gov and Cochrane Library. Studies published in English between 2000 and 2017 and whose population was patients of reproductive age (15–49) were included. Studies without a comparison group were excluded. Two independent reviewers assessed eligibility, study quality and abstracted data.

Results. Of 24 780 titles and/or abstracts reviewed, nine studies met inclusion criteria: four randomized controlled trials (RCTs) and five observational studies. Two RCTs and one quasi-experimental cohort study showed a statistically significant increase in knowledge related to healthier pregnancy, such as the benefits of folic acid supplementation, and increased risk profiles for those with chronic conditions. Among studies measuring contraceptive use, only one cohort study showed any increase while the RCT and retrospective cohort did not show a statistically significant effect. Neither of the two RCTs that assessed the provision of contraception by primary care providers for those not desiring pregnancy found increased access to contraception, although one found increased documentation of contraception in electronic medical records. Acceptability of reproductive intention screening was measured in seven studies, and participant satisfaction was high in all seven studies.

Conclusions. More research is needed to determine whether routine inclusion of reproductive intention screening in primary care is warranted.

Key words: Contraception, preconception care, pregnancy intention, pregnancy outcome, primary care, systematic review.

Introduction

Despite the social, health and economic benefits of reducing unmet contraceptive need and increasing preconception care (1–7), no guidelines exist for the provision of routine counselling regarding reproductive intentions in primary care settings. In 1995, the US Preventive Services Task Force included counselling

as a recommended intervention to prevent unwanted pregnancy. However, this recommendation has not been included in the published list of recommendations in any subsequent year (8). Asking reproductive aged patients about pregnancy intentions in the primary care setting could reduce unmet contraceptive need through contraceptive provision and/or referral (9) and increase the health of wanted pregnancies through preconception care, including chronic disease management, folic acid uptake and reduced risk of exposure to teratogenic substances, such as drugs, alcohol and medications (10–14).

Given competing demands for provider time during client–provider interactions and limited health resources, evidence that this practice improves health outcomes is needed before recommending reproductive intention screening as standard practice in primary care. We therefore conducted a systematic literature review to synthesize and assess experimental and observational studies on the effect of asking individuals of reproductive age in primary care settings about their reproductive plans on reproductive health outcomes.

Methods

The full search strategy and study protocol has been described elsewhere (15) and is registered with the PROSPERO International Prospective Register of Systematic Reviews (CRD42015019726) (16). The protocol was approved by the Children's and Women's Hospital, University of British Columbia, Research Ethics Review Board (H15-01404) and was exempt from review at the CUNY School of Public Health.

Eligibility criteria

For eligibility, the studies had to:

(1) include an assessment of reproductive intention and subsequent reproductive health outcome(s), measured quantitatively which could include knowledge of contraception or prenatal care, behavioural changes based on understanding of risk, provision of contraceptive or preconception care counselling, contraceptive uptake, or any pregnancy-related outcome;
(2) include a comparison group, using either a control group or a pre–post intervention design;
(3) consist of patients of reproductive age (15–49 years) presenting to primary health-care settings, defined as a health-care setting that is the first point of care for undifferentiated patients with an undiagnosed condition or concern;
(4) be published in English between January 2000 and July 2017;
(5) be conducted in North America, Europe or Australia, as recommendations for health systems in low- and middle-income country settings are likely to differ.

Search methods and strategy for identification of studies

We performed extensive searches in Ovid Medline, Pubmed, CINAHL, Embase, CDR/DARE databases, Web of Science, ISRCTN registry, Clinicaltrials.gov and Cochrane Library. Additionally, the references of identified articles were hand-searched. The following medical subject heading (MeSH) search terms were used, [('fertility' or 'pregnancy') and ('motivation' or 'intention' or 'reproductive behavior' or 'contraception' or 'pregnancy, unplanned'); and ((pregnan* or procreat* or conceive* or fertil* or conception) adj3 (intent* or intend* or plan* or want* or unwant* or desire* or unplan* or contracept* or birth control*))] and 'counselling' or 'preconception care' or 'family planning services' or (question* or survey* or interview* or exam* or assess* or counsel* or ask*).

The search criteria yielded a high number of results; for example, the PubMed search initially yielded over 37 000 citations. Expert consultation recommended applying a 'clinical trials' filter (which includes observational studies as it is distinct from the 'randomized controlled trial' filter) in PubMed, which reduced the citations substantially. Due to the lack of precise terms to adequately describe reproductive intention screening, two articles found by experts were not among the search results, which led the authors to conduct three targeted, additional searches using the phrases 'reproductive life plan'; 'preconception counseling' OR 'preconception counselling' OR 'pre-conception counseling' OR 'pre-conception counselling'; and 'pregnancy intention.' The last search was completed on 31 July 2017.

Two review authors (CKB and PAH) independently screened titles and/or abstracts of studies retrieved using the search strategy for eligibility. These same two reviewers assessed full text of potentially eligible studies, with disagreements reconciled through discussion with a third and fourth reviewer (HEJ and WVN).

A pre-piloted form was used to extract data for evidence synthesis including study setting; study population, participant demographics and baseline characteristics; details of the interventions and control conditions; study methodology; recruitment and study completion rates; outcomes and times of measurement; suggested mechanisms of intervention action; and assessment of the risk of bias.

Assessment of risk of bias in included studies

Two authors (CKB and PAH) independently assessed the risk of bias in included studies using the JADAD scale for experimental studies (17) and the Newcastle-Ottawa scale for observational studies (18,19). Disagreements were resolved by discussion with the third and fourth author (HEJ and WVN).

Data synthesis

We present a summary of the interventions that were tested, their effects on reproductive health outcomes and the likelihood for bias of the included studies. For ease of interpretation, we include the first author of the article in the text in addition to the citation. We present the effectiveness of the screening on reproductive health outcomes between experimental and control/pre-experimental groups as a comparison of proportion or mean or as a risk or odds ratio (RR or OR).

Results

The systematic search resulted in 24 780 unique citations, of which 24 684 articles were excluded after title and/or abstract screening (Fig. 1). The remaining 87 articles were reviewed in full text to determine eligibility. Of these, nine articles met the inclusion criteria (Figure 1).

Six studies were conducted in the USA: four in Pennsylvania (Lee, Schwarz 1–3) (20–23), one in California (Mittal) (24) and one in Ohio (Bommaraju) (25) (Table 1). Three studies were conducted in Europe: two in the Netherlands (de Jong-Potjer, Elsinga) (26,27) and one in Sweden (Stern) (28). The study designs included five (Schwarz 1, Schwarz 2, de Jong-Potjer, Elsinga and Stern) randomized controlled trials (RCTs) (21,22,26–28), one of which (Elsinga) was analysed as a prospective cohort study (27), one retrospective cohort study (Bommaraju) (25), two quasi-experimental studies (Schwarz 3, Mittal) (23,24) and one cross-sectional study (Lee) (20).

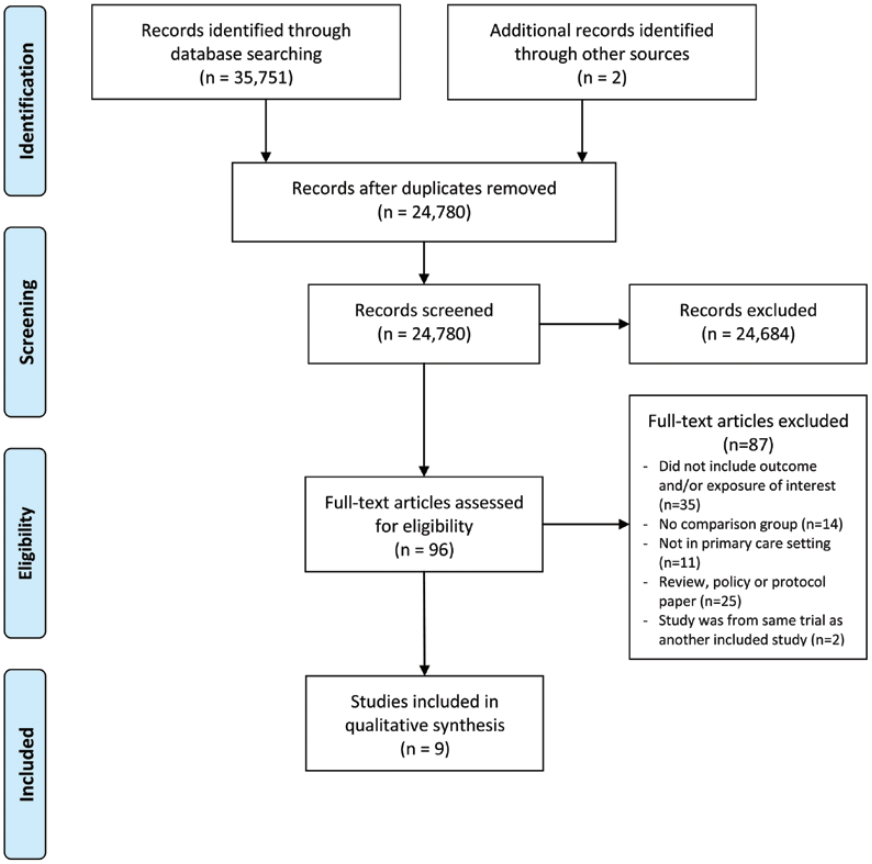

Figure 1. Diagram of systematic literature review on the effect of reproductive intention screening in primary care settings on reproductive health outcomes, 2000–17.

The studies represent diverse primary care settings. Three studies included sites in an academic general internal medicine setting (Lee, Schwarz 1, Schwarz 3) (20,21,23), three in community-based family practice (Lee) (20) or general practice settings (de Jong-Potjer, Elsinga) (26,27), one in a general hospital family health centre (Mittal) (24), one in acute care (Schwarz 2) (22), one in a university student health centre (Stern) (28) and one in a department of health primary care clinic (Bommaraju) (25). All nine studies included women of reproductive age and did not include men.

Reproductive intention screening

The manner in which reproductive intention questions were asked and subsequent counselling varied. The Mittal, Bommaraju and Stern studies used client–provider discussion of a 'reproductive life plan (RLP)' (24,25,28). Bommaraju focused exclusively on the adaptation of an RLP for women with chronic diseases (hypertension, obesity, and/or diabetes) (24), while Mittal and Stern did not have a specific population focus (25,28). Two of these studies used a comprehensive educational component: Stern focused on family planning or folate use, depending on her reproductive intentions (28), Mittal on risks associated with pregnancy for women with chronic disease (24). The Bommaraju study included a less structured conversation regarding an RLP (25).

The two Dutch studies (de Jong-Potjer and Elsinga) were based on the 'Parents to Be' RCT to assess the effectiveness of preconception counselling on improved pregnancy outcomes (26,27). GPs randomized to the intervention arm asked patients by mail if they were planning a pregnancy in the next year and if so, if they were interested in receiving preconception counselling from their GP. Those who agreed to receive preconception counselling were compared with control groups who received usual care with no preconception counselling.

Three studies by Schwarz and colleagues tested the use of electronic health systems for screening. Schwarz 1 used an electronic intake form on reproductive intentions to increase contraceptive counselling and provision (21), Schwarz 2 a patient-based kiosk to assess reproductive intentions and promote contraceptive counselling (22) and Schwarz 3 a clinical decision support tool to increase contraceptive counselling with prescription of teratogenic medications (23). The final study by Lee used a reproductive intention screening question on a questionnaire as eligibility for inclusion in the study to assess the effect of contraceptive counselling for women in primary care on contraceptive use at last intercourse (20).

Effect of screening on reproductive health outcomes

Five studies measured a contraception-related primary outcome (Lee; Schwarz 1, 2 and 3; and Bommaraju) (20–23,25). Three of these five studies measured contraceptive use at follow-up (ranging from 7 days to 3 months post-baseline): one RCT (Schwarz 2) (22) and two observational studies (Lee and Bommaraju) (20,25). Of these, only the observational study by Lee found a modest effect: adjusted models showed that women in need of contraceptive counselling who received counselling were more likely than women who did not receive counselling to report hormonal contraceptive use at last intercourse (2.7 OR, 95% confidence interval, CI, 1.5–4.9)

Table 1. Chronological summary of studies assessing the effects of inclusion of reproductive intention screening in primary care setting on reproductive health outcomes

First author (Year)	Study design	Sample	Reproductive intention screening exposure or intervention	Outcome measure(s)	Results on effectiveness of intervention/association with exposure (** for statistically significant findings)
de Jong-Potjer (2006)	Cluster RCT	2276 female patients aged 18–40 from network of 67 GPs in the Netherlands 1186 intervention patients from 30 GPs 1090 control patients from 27 GPs	*Intervention* Based on the 'Parents to Be' RCT to assess the effectiveness of preconception counselling on improved pregnancy outcomes, patients in the intervention practices asked whether planning a pregnancy and, if yes, whether interested in receiving preconception counselling from their GP. *Control* Standard clinical care	All participants assessed for anxiety at baseline questionnaire and retrospectively in the first trimester two months after pregnancy ended STAI six-item anxiety inventory, with scores 20–80, with low scores being less anxiety	**Within the intervention group, preconception counselling provided by the GP was associated with an average decrease of 3.6 points (95% CI 2.4–4.8) on the anxiety scale comparing anxiety before and after counselling. There was no difference in mean level of anxiety for those who had a pregnancy between the experimental (38.7; 95% CI 37.9–39.5) and control group (38.5; 95% CI 37.7–39.3).
Elsinga (2008)	Matched prospective cohort *(within a cluster RCT)*	633 female patients aged 18–40 from network of 67 GPs in the Netherlands 211 exposed patients 422 control patients	*Exposure* Based on the 'Parents to Be' RCT to assess the effectiveness of preconception counselling on improved pregnancy outcomes, patients in the intervention practices who were planning a pregnancy in the next year and received preconception counselling *Control* Standard clinical care matched to exposed patients by age, education, country of origin and pregnancy history	Knowledge of healthy behaviours during pregnancy based on 20 essential items Self-report of healthy behaviours during pregnancy	**Women receiving PCC had statistically significantly higher knowledge scores on the 20 essential items (81.5% versus 76.9%, $P < 0.05$) than women who did not. **Compared with control women, more women receiving PCC used folic acid in the recommended period (aOR 4.93, 95% CI 2.81–8.66) and fewer used alcohol in the first three months of pregnancy (aOR 1.79, 95% CI 1.08–2.97) in adjusted models. Among women who received standard care, adverse outcomes were reported in 20.2% of pregnancies compared with 16.2% in women who attended PCC (OR 0.77; 95% CI 0.48–1.22).
Lee (2011)	Cross-sectional study	770 female patients aged 18–50 years from four primary care clinics in Pennsylvania in need of contraceptive counselling based on reproductive intentions and non-use of contraception 286 exposed patients 484 control patients	*Exposure* Those who received any contraceptive counselling during index primary care visit *Control* Those who did not receive contraceptive counselling during index primary care visit	Self-reported use of any reversible contraceptive method, hormonal method or highly effective reversible method at last intercourse 7–30 days after primary care visit	**In adjusted models, women who received contraceptive counselling had 2.68 (95% CI 1.48–4.87) times the odds of using hormonal contraceptive at last intercourse. Findings were similar but not statistically significant for use of any reversible contraception (aOR 1.55; 95% CI 0.91–2.66) and use of highly effective reversible method (aOR 2.24; 95% CI 0.78–6.47) at last intercourse.

Table 1. *Continued*

First author (Year)	Study design	Sample	Reproductive intention screening exposure or intervention	Outcome measure(s)	Results on effectiveness of intervention/association with exposure (** for statistically significant findings)
Schwarz 1 (2012)	Cluster RCT	2304 female patients aged 18–50 years from 53 primary care physicians in a large, academic general internal medicine practice in Pennsylvania 1589 primary care visits from 27 intervention physicians 3782 primary care visits from 26 control physicians	*Intervention* Questions about pregnancy intention and recent contraceptive use added to electronic patient intake questionnaire to increase contraceptive counselling and provision. *Control* Standard intake questionnaire	Documentation of contraceptive use in medical chart at any visit and during visits that included prescription of teratogenic medication	**Significantly greater improvement in documentation of contraceptive use in the intervention group compared with the control group, with +77.4 (95% CI 70.7–84.1) adjusted percentage points in the intervention group compared with +3.1 (95% CI 1.2–5.0) in the control group ($P < 0.001$); This pattern held for visits including the prescription of teratogenic medications. No significant differences in the provision of new family planning services between the intervention and control physicians, with +0.3 (95% CI −2.8 to +3.3) compared with −1.4 (95% CI −3.3 to 0.4) adjusted percentage point changes before and after introduction of intervention ($P = 0.3$).
Schwarz 2 (2013a)	RCT	515 female patients aged 18–45 in need of contraception per reproductive intention question from the waiting rooms of four urban acute care settings in Pennsylvania 214 intervention, 301 control After loss to follow-up: 117 intervention, 81 control	*Intervention* Patients were recruited in the waiting areas of acute care settings to use a kiosk with an interactive computer module that provided information about contraceptives and the opportunity to request a prescription *Control* A kiosk with an interactive computer module that provided information about screening for Chlamydia infection	Self-report having received contraceptive prescription, contraceptive use at last intercourse, unintentional pregnancy and contraceptive knowledge three months after clinic visit	**Women in the intervention arm were more likely to report having received contraception at the visit than women in control arm (16% versus 1%, $P = 0.001$). All other results were in the same direction but not statistically significant: contraceptive use at last sex (71% versus 65%, $P = 0.91$). unintended pregnancy (0.9% versus 3.8%, $P = 0.31$) knowledge of contraception (21.4% versus 15.0% knew IUDs are as effective as tubal ligation, $P = 0.26$; 86.3% versus 78.8% knew ring and patch are as effective as birth control pills, $P = 0.16$; 28.2% versus 23.8% knew one in seven women using condoms typically becomes pregnant within first year of use, $P = 0.49$).

Table 1. *Continued*

First author (Year)	Study design	Sample	Reproductive intention screening exposure or intervention	Outcome measure(s)	Results on effectiveness of intervention/association with exposure (** for statistically significant findings)
Schwarz 3 (2013b)	Quasi-experimental study	801 female patients aged 18–50 from one of four community-based/academic general medicine clinics in Pennsylvania 41 physicians had clinical decision support for one year, then 20 had it turned off for nine months 188 women prescribed potential teratogen while CDS in place 26 prescribed potential teratogen while CDS not in place 587 prescribed non-teratogenic medication	*Intervention* Tested the use of electronic health systems for screening. CDS in electronic medical record system with alerts to counsel on contraception when teratogenic medications prescribed *Control* Contraceptive counselling when clinical decision system not in place	Self-report receipt of counselling regarding medication-induced birth defects and/or contraception at their visit 5–30 days after index primary care visit	No difference in proportion of women who received potential teratogen being counselled about risk of birth defects or contraception between those seen during use of CDS versus those seen when CDS was not being used (57.5% versus 53.9%, $P = 0.92$). No difference across all three groups in terms of proportion received contraceptive counselling (34.4% in group prescribed non-teratogenic medication, 37.6% in group prescribed teratogenic medication with CDS in place, 32.0% among group prescribed teratogenic medication without CDS in place, $P = 0.41$–0.48).
Stern (2013)	RCT	299 Swedish-speaking female university students visiting a Student Health Center for contraception, chlamydia testing or cervical cancer screening in Sweden 101 intervention 198 control group (100 with baseline questionnaire; 98 without baseline questionnaire)	*Intervention* Comprehensive educational semi-structured discussion on the woman's reproductive life plan with targeted counselling based on the woman's reproductive intentions. Counselling focused specifically on family planning or folate use. *Control* Standard clinical care.	Self-reported knowledge of benefits of folic acid and knowledge of reproduction score (out of 20) two months after clinic visit	**Women in the intervention arm were more likely to report the benefits of folic acid intake on pregnancy at follow-up (22% versus 3%, $P = 0.001$), with both groups unlikely to report this benefit at baseline (4% versus 5%, $P = 0.881$). **Overall knowledge of reproduction increased in the intervention group between baseline and follow-up with no difference in the control group mean score increased from 6.4 ± 2.9 to 9.0 ± 2.8 in intervention group, while it was 6.1 ± 2.6 baseline versus 6.8 ± 2.5 follow-up for first control group, and 6.3 ± 2.2 for control group without baseline at follow-up.

Table 1. *Continued*

First author (Year)	Study design	Sample	Reproductive intention screening exposure or intervention	Outcome measure(s)	Results on effectiveness of intervention/association with exposure (** for statistically significant findings)
Mittal (2014)	Quasi-experimental study	27 non-pregnant Spanish or English-speaking female patients aged 18–40 years with diabetes, hypertension or obesity at hospital in San Francisco, CA	*Intervention* RLPC adapted for women with chronic conditions administered by two resident physicians *Control* Pre-RLPC	Self-report understands pregnancy risks associated with diabetes, hypertension and obesity directly after the clinic visit, based on Likert scale of 1 strongly disagree to 5 strongly agree	**More women reported agreeing that they understand the risks of pregnancy associated with all three conditions: mean pre-counselling score of 3.16 ± 1.14 increased to 4.40 ± 0.95, $P < 0.001$ post-counselling for diabetes; mean pre-counselling score of 3.32 ± 1.07 increased to 4.35 ± 0.95, $P < 0.001$ post-counselling for hypertension; mean pre-counselling score of 3.59 ± 1.34 increased to 4.37 ± 0.88, $P = 0.007$ post-counselling for obesity.
Bommaraju (2015)	Retrospective cohort	771 self-identified Black, white or Latina female patients aged 16 years and older who received reproductive health services from the Cincinnati Health Department's primary care health centrs during study period with at least a seven-week window in which to have a follow-up appointment to receive the contraceptive method of their choice 322 exposed 449 control	*Exposure* Minimally structured conversation regarding RLPC recorded having occurred on electronic medical record *Control* No RLPF recorded on electronic medical record	Contraceptive use at the end of the study period (no method/non-medical method/barrier; hormonal pills/patches/rings; DMPA; or LARC/IUD/Implant)	Provision of RLPC was not associated with contraceptive use, 18.3% of women receiving RLPC were in the no method/non-medical/barrier method group; the proportion of women not receiving RLPC in this group was not reported. Adding RLPC to the multivariable regression model predicting contraceptive use did not improve model fit (–2 log likelihood $P = 0.209$).

RCT, randomized control trial; CG, control group; RLP, reproductive life plan; PCC, preconception counselling; GP, general practitioner; DMPA, depot medroxyprogesterone acetate; RLPC, reproductive life plan counselling; LARC, long acting reversible contraception; CDS, clinical decision support; STAI, Spielberger State Trait Anxiety Inventory.

Table 2. Summary of bias assessment scores using the JADAD (17) scale of randomized controlled trials included in systematic review by first author and year of publication

	de Jong-Potjer (2006)	Schwarz 1 (2012)	Schwarz 2 (2013a)	Stern (2013)	Points possible
Described as randomized	1	1	1	1	1
Method of randomization described and appropriate	1	0	0	0	1
Described as double blinded	na	na	na	na	na
Method of double blinding described and appropriate	na	na	na	na	na
Withdrawals and dropouts described	1	1	1	1	1
Points (%)	3/3 (100)	2/3 (67)	2/3 (67)	2/3 (67)	3

Double blinding not applicable to provider counselling, with cluster randomization.
na, not applicable.

Table 3. Summary of bias assessment scores using the Newcastle-Ottawa scale (18,19) for observational studies included in systematic review by first author and year of publication

	Elsinga (2008)	Lee (2011)	Mittal (2014)	Schwarz (2013b)	Bommaraju (2015)	Possible points
Representativeness of sample	1	1	1	1	1	1
Sample size	na	0	0	0	na	1
Non-respondents	na	0	0	0	na	1
Selection of the unexposed (cohort)	1	na	na	na	1	1
Outcome not present at start	0	na	na	na	0	1
Ascertainment of the exposure	1	1	1	1	0	1 or 2
Comparability	2	2	2	2	2	2
Assessment of the outcome	1	2	2	1	1	2
Statistical test	na	1	1	1	na	1
Adequate follow-up time	1	na	na	na	1	1
Adequacy of follow-up of cohort	1	na	na	na	1	1
Total points (%)	8/9 (89)	7/10 (70)	7/10 (70)	6/10 (60)	7/9 (78)	9 or 10

Na, not applicable for this type of study design.

and more likely (2.2 OR, 95% CI 0.8–6.5) to use any highly effective method (20). Most participants (92.3%) reported being satisfied with the counselling received (20). The second observational study by Bommaraju, a retrospective cohort of electronic medical records for women with at least 7 weeks of follow-up, did not find an effect of RLP counselling on contraceptive use (25). This study took place at an urban clinic supported by Title X (a US federal grant programme dedicated to providing individuals with comprehensive family planning and related preventive health services and widely utilized by low-income or uninsured individuals). In the RCT (Schwarz 2), women randomized to computer-delivered contraceptive information on contraception were more likely (1.4 OR, 95% CI 0.3–5.7) to report any contraception at 3 months of follow-up compared with those randomized to receive information on chlamydia, but the finding was not statistically significant (22). This study reported a high level of satisfaction with the computer module (85–95%); however, most participants (65%) preferred to discuss contraception with a provider (22).

The two other studies with contraceptive outcomes (Schwarz 1 and 3) assessed family planning counselling and documentation of that counselling (21,23). Both studies found no increase in provision of new contraceptive services among intervention physicians compared with control physicians. However, the RCT (Schwarz 1) found higher rates of contraceptive documentation in patient health records, with +77.4 (95% CI 70.7–84.1) adjusted percentage points in the intervention group compared with +3.1 (95% CI 1.2–5.0) in the control group from baseline to post-intervention ($P < 0.001$) (21). Both studies found the interventions highly acceptable to patients, as measured by proportion of participants (93%) who answered the contraceptive vital sign questions on the intake form (21), or through reported satisfaction (87–95%) with contraceptive or teratogenic risk counselling when these encounters occurred (23).

Stern, Elsinga and Mittal reported changes in knowledge to promote healthy pregnancies, including basic knowledge of human reproduction (28), folic acid supplementation (28), risk understanding of pregnancy with chronic conditions (24) and understanding risky behaviours during conception and pregnancy (27). All three reported statistically significant increased knowledge (24,27,28). The RCT by Stern reported increased knowledge scores of reproduction in general and of folic acid intake in the intervention group, with the mean score increasing from 6.4 to 9.0 out of a maximum of 20 points when compared with the control groups ($P < 0.001$). In this study, the majority of women (90%) reported a positive experience with the RLP (28). The Elsinga study, an observational study, found that preconception counselling among women who wanted a pregnancy in the next year had positive effects on knowledge, with women receiving preconception counselling scoring 4.6% (95% CI 2.6–6.6) higher on the total score for 20 essential items compared with women receiving standard care (27). The third study, an observational study by Mittal, reported significant increases in risk understanding of pregnancy associated with diabetes, hypertension and obesity following the educational RLP intervention, as well as an increased ability to make choices about their reproductive health (24).

Only the Elsinga observational study measured pregnancy-related behaviour change. Compared with women receiving standard care, women planning a pregnancy in the next year who received preconception counselling were more likely (4.9 OR, 95% CI 2.8–8.7) to use

folic acid in the recommended period and less likely (1.8 OR, 95% CI 1.1–3.0) to have used alcohol in the first three months of pregnancy (27). Among women who received standard care, adverse outcomes were reported in 20.2% of pregnancies compared with 16.2% in women who attended preconception counselling, but this difference was not statistically significant (0.8 OR, 95% CI 0.5–1.2) (27).

Risk of bias in included studies

The bias assessment of the RCTs (21,22,26–28) can be seen in Table 2. One study (de Jong-Potjer) achieved 100% of the three possible points (26) and the other three studies 67% (21,22,28). The method of randomization was only described and considered appropriate in one RCT, the de Jong-Potjer study (26). Loss to follow-up was high in the US RCTs, with 47% (21) and 81% (22) of participants not completing follow-up (Schwarz 1 and Schwarz 2) and lower in the European studies with 12% (28) and 29% (26) of participants being lost to follow-up (Stern and de Jong-Potjer). For the observational studies, the bias assessment scores ranged from 60% (Schwarz 3) (23) to 89% (Elsinga (27), Table 3).

Discussion

Based on the results of this systematic literature review, we found little high-quality evidence to support implementing full-scale programmes that incorporate reproductive intention questions into primary care. Only nine articles met inclusion criteria for this review (2000–17), the majority of which were published since 2011. This trend suggests increased interest in this topic as initiatives that seek to formalize integration of reproductive intention and reproductive health in general into primary care, such as the 'One Key Question' initiative (9), gain momentum. However, more high-quality research is needed to evaluate such initiatives before wide scale implementation.

Of the nine studies identified, only four were RCTs (Schwarz 1, Schwarz 2, de Jong-Potjer and Stern) (21,22,26,28). While some positive outcomes were seen, the results were not overwhelmingly strong. The RCT with the highest assessment for low bias (de Jong-Potjer) only showed a significant change in anxiety around pregnancy within the intervention group when comparing before and after counselling, but no significant change between the intervention and control groups (26). Although both of the Schwarz studies reported increases in contraceptive use, contraceptive documentation in the electronic medical record, knowledge about contraception and a decrease in unintended pregnancy, many of these results were not statistically significant (21,22). The Stern study had similar results, with increases seen in reproductive knowledge, but with both significant and non-significant findings (28).

None of the studies reviewed included long-term contraceptive outcomes, with follow-up time ranging from 7 days to 3 months. While three studies (Mittal, Elisnga and Stern) showed an increase in short-term knowledge around healthy pregnancy (24,27,28), only one observational study by Elsinga assessed behaviour change related to pregnancy, which showed an increase in folate use and a decrease in alcohol use (27). In terms of the effect on short-term contraceptive use, the results were mixed, with one observational study by Lee finding a positive association (20), one observational study by Mittal finding no association (25) and one RCT (Schwarz 1) finding a non-statistically significant association (21). Neither of the RCTs by Schwarz (1 and 2) that assessed the impact of including pregnancy intention questions on contraceptive counselling found an association (21,22), beyond an increase in contraceptive documentation (Schwarz 1) (21).

Included studies in this review were representative of a wide diversity of study populations, and the persistence of socioeconomic disparities in unmet contraceptive need and maternal and child health outcomes must be considered (29–31). Effective interventions are needed to address these disparities. While inclusion of reproductive intention screening into primary care may be one such intervention, currently there is insufficient high-quality research to show its effectiveness on health outcomes. Future research should focus on outcomes that require longer follow-up periods, including contraceptive use, rates of unwanted pregnancy and pregnancy outcomes. All studies reporting on the user experience or acceptability of the intervention showed a high level of satisfaction.

A limitation of this review was the imprecision of language surrounding both the interventions and outcomes of interest. Our interventions of interest could not be described by a single term or even a few specific terms, but had to include such vague terms as 'discussion' or 'question'. A similar effect was observed with our outcomes of interest, which included any pregnancy-related outcome. These challenges present the possibility that our search strategy failed to find relevant articles. However, given the high number of articles that met our initial search criteria (24 780) and were reviewed for inclusion, we are confident that we have captured the large majority of studies published within this time frame.

Our systematic review on the effect of including a question on reproductive intention during a primary care visit found few high-quality studies with limited evidence of effectiveness, although patients reported high satisfaction. More research on the effectiveness of the incorporation of reproductive intention questions into primary care on reproductive health outcomes is needed to inform primary care practice. Future research should focus on both short- and long-term effects on reproductive health outcomes and should include individuals at the highest risk for poor reproductive health outcomes in order to reduce health disparities.

Declaration

Funding: WVN is supported with a Chair in Applied Public Health Research from the Canadian Institutes for Health Research and the Public Health Agency of Canada (CPP137903) and as a Scholar of the Michael Smith Foundation for Health Research. PAH was supported with a scholarship from the CIHR-PHAC Chair in Family Planning Public Health Research (CIHR, CPP-137903). The study was funded by departmental resources.
Ethics: The review protocol was registered with the PROSPERO International Prospective Register of Systematic Reviews (Registration Number CRD42015019726, 31/07/2015) and was approved by the Children's and Women's Hospital, University of British Columbia, Research Ethics Review Board (H15-01404). The review was considered exempt from ethical review by the CUNY School of Public Health's Institutional Review Board.
Conflict of interest: WVN is an associate editor of *Family Practice*.

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