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FROM THE FIELD

Primary Care Women's Health Screening: A Case Study of a Community Engaged Human Centered Design Approach to Enhancing the Screening Process

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Abstract

Purpose To apply a Human Centered Design (HCD) approach to co-designing a comprehensive women's health screening tool with community partners.

Description Evidenced-based health screenings for behaviors and risks are important tools in primary health care and disease prevention, especially for women. However, numerous barriers limit the effective implementation of comprehensive health screenings, and often lead to excluding important risks such as intimate partner violence (IPV). Utilizing a human centered design approach (HCD), Mountain Area Health Education Center (MAHEC, NC USA) developed a community co-designed 9-topic health screening for women. Key end-users were recruited to participate in the design process, including women who identified IPV as a health issue in their community, Spanish speaking women, domestic violence program organizers, and MAHEC staff.

Assessment A total of 21 participants collaborated during three design sessions on two specific goals: 1) creating a comprehensive women's health screening tool from the existing tools that were in use in our clinics at the time, and 2) incorporating IPV screening. Through the HCD sessions, participants highlighted the impact of what they termed "Triple T: time, trust and talk" on the effectiveness of women's health screening.

Conclusion Our co-designed women's health screening tool is a first step towards addressing screening barriers from both primary care provider's and community women's perspectives. Future research will explore the facilitators of and barriers to implementing the tools in different primary care settings. Future work should also more systematically examine whether and how screening processes may reinforce or contribute to women's feelings of being stereotyped, and how screening processes can be designed to avoid stereotype threat, which has the potential to reduce the effectiveness of screenings intended to promote women's health.

Keywords Health screenings · Women · Intimate partner violence · Human center design

Significance

What is already known on this subject? Health screenings are an important tool for quality primary health care. These screenings are especially important for women, who play a crucial role in the health of our communities. However, multiple barriers are encountered in conducting well-rounded health screenings in primary care. Furthermore, many health screenings for women have excluded important determinates of health, such as intimate partner violence.

What this study adds? Through a collaborative Human Centered Design process with local community members, comprehensive and engaging health screenings can be made. This study further demonstrates a community-based participatory research method that can be applied in other healthcare settings.

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Introduction and Objectives

Health screenings are a central component of primary health care and prevention. For women, screenings may also affect community health given the critical role women play in their own, their children's and their overall family's health and health care decision making. Numerous recommendations from the U.S. Preventive Services Task Force (USPSTF 2018), the American Academy of Family Physicians (AAFP 2018), and the American College of Obstetricians and Gynecologists Women's Preventive Services Initiative (ACOGWPSI 2017) identify the need for women's health screening for medical, behavioral, nutritional, psychological and social determinants of health not only for women themselves, but also for the benefit of their children. Specific recommended screenings include, but are not limited to, depression, tobacco, alcohol, drugs, and intimate partner violence (IPV).

Routine implementation of health screening for women, however, can be difficult to achieve. Miller et al. (2015) provide a detailed list of the barriers to implementing IPV screening in medical practices, including lack of time, resources and training. Other research highlights competing priorities and constraints that may further impede implementation within primary care (Hamberger et al. 2015). As insurers move to value based reimbursement, primary care practices also face increasing workloads and time demands due to quality metric reporting and associated Patient Centered Medical Home recognition requirements (Asche et al. 2017; Casalino et al. 2016). Whether and how these pressures and competing priorities within primary care influence women's perceptions and the ultimate effectiveness of health screening processes has not been explored in the literature, despite increasing calls for women-centered designs in prenatal and women's healthcare (Chedid and Phillips 2018).

Within this context, the North Carolina Coalition Against Domestic Violence (NCCADV) engaged multiple primary care practices across North Carolina to study the implementation of IPV screening. While all sites received standardized IPV training, sites were allowed to tailor the screening implementation to their own needs. The Mountain Area Health Education Center (MAHEC) Department of Family Medicine used this opportunity to design an overall women's health screening process which included existing screening tools/topics (pregnancy intention and contraception, body weight, physical activity, multivitamin and folic acid use, tobacco, alcohol and substance use, depression, IPV and sexuality). Recognizing the need to create a safe environment for women to discuss various aspects of their health, including experiences of IPV, the MAHEC site used a human centered design (HCD) approach to co-design a new screening tool with local community women (Chedid and Phillips 2018; Miller et al. 2015). HCD is a co-design process that brings end-users and project team together to work collaboratively on a design challenge from a basis of empathy for all stakeholders (Matheson et al. 2015). This case study provides an overview of the HCD approach taken, the insights from community women that shaped the new screening tool and lessons learned about how screening processes may be perceived by women.

Methods

Participants

The HCD process engaged representatives from key end-user groups: women from a local Housing Authority neighborhood that had identified IPV as a health issue; women from the local community whose preferred language is Spanish; representatives from the local domestic violence organization; clinical staff and providers from both the family medicine and obstetrics/gynecology divisions at MAHEC. Given the sensitive nature of discussing IPV, the study team agreed that the recruitment of community women required existing trusting relationships. Therefore, MAHEC employees with existing community relationships directly recruited women to participate, and explained the project and the expected role of community women. Clinical staff from MAHEC were recruited based on their roles in conducting screenings as they would be end-users of the developed product. An HCD team comprised of a Quality Improvement consultant supporting the implementation of the IPV program, an electronic health record (EHR) and data reporting technician; the physician champion for the project, the HCD facilitator, a graphic designer and two research staff attended all sessions and internal meetings throughout the HCD process. To ensure equity in participation, all participants were paid for their time working on the project. MAHEC staff and the local domestic violence organization staff time was covered as work time, paid through their normal salary for time spent in the HCD sessions. Community women received an hourly stipend for their actual time spent participating, and also received reimbursement for childcare expenses, if needed.

All work for the implementation of the IPV screening and follow-up, as well the research on the human centered design activities were covered under the University of North Carolina—Chapel Hill IRB (Study number 16-2424) and funded through the NCCADV.

HCD Methods

This HCD application had two goals: (1) creating a comprehensive women's health screening tool from the existing tools being used at the time, and (2) incorporating IPV screening. Two separate design sessions focused on each goal, while a third session tested the prototype screening tool developed from the prior sessions. All design sessions lasted 2-h, which was deemed sufficient for achieving the goal while accommodating clinic staff and community partner schedules. Session structure and activities were primarily based on the design innovation frameworks proposed by Kumar (2013) and the LUMA Institute (2012) that categorize activities as supporting 'Understanding' or 'Making'. Understanding activities describe surrounding trends and developments, facilitate knowing the people involved and impacted as well as the context in which they interact with the topic under study, and synthesize learnings into insights (Kumar 2013; LUMA Institute 2012). Making activities explore the derived concepts and frame solutions (Kumar 2013; LUMA Institute 2012). Our HCD team selected activities, described in Table 1, under the categories of Understanding and Making that promoted empathy and relationship among the participants, solicited participant feedback on screening questions and processes, promoted group interaction, and were feasible within the 2-h sessions. To support the overall design process, the team used debrief sessions to review inputs and results from the previous week's session, summarize key themes and patterns, and apply learnings to the subsequent session. Incorporating a graphic designer into the debriefs and sessions 2 and 3 allowed us to develop prototypes for several key tools to support a new experience for women's health screening.

Looking and Understanding Design Needs (Session 1)

Session 1 began with an empathy-developing exercise to promote empathy, connection, and curiosity among the participants, who did not all know each other (Table 1). Participants then named potential barriers to health screenings, telling personal stories to contextualize their points. Breaking into small groups comprised of individuals from different roles, groups reviewed the eight health screenings given to women at various times (new patient paper work, annual visits) and the HARK questionnaire for IPV ("Appendix"), that had not been used previously (Sohal et al. 2007). Using the Rose, Bud, Thorn tool (Table 1), the small groups identified potential problem areas within the health screening experience. Each participant then described problems with the screening instruments and passed their work to the person on their right using a round robin concept ideation process (Table 1), where the next person worked on a solution to the prior person's problem statement. From this work, the groups created concept posters (Table 1) with a title and graphic representing the important elements of the health screening process identified during the round robin. Using colored dots participants identified the overall concept they preferred and the elements of each poster they felt should be included in the design. During debrief, the HCD team identified themes by iteratively categorizing the post-it notes from the rose-bud-thorn documents and examining the round robin problems/solutions and concept posters.

Incorporating IPV Screening (Session 2)

The 2nd session began with an empathy-developing personal story of experiencing IPV and a video demonstrating how screening for IPV has impacted healthcare providers and staff. Participants followed with a round robin discussion of what the IPV screening experience is like from the perspectives of patients, physicians and clinical staff.

Participants then received a pre-designed IPV screening workflow that included specific tools and staff roles. We chose a design tool called the 5E (entice, enter, engage, exit, and extend) which encourages participants to design around the end-user's experience (Table 1) through five distinct phases of customer journey (i.e. health screening). Participants worked in small groups to identify elements in the screening process that created barriers to an effective experience followed by describing actionable problems encountered by women and turning them into a new experience grounded in empathy. The resulting sequencing of solutions were presented in three concept posters representing each group's desired future state.

Prototype Learning (Session 3)

The final session consisted of simulated testing of tools, scripts and work flows for new and established patients based on the data and concepts generated during the previous sessions. Participants created three groups with each person playing a specific role in the simulations. Community members played the patient role. Staff played the roles of front desk, medical assistant, provider and check out. Research and marketing staff were facilitators and note takers using a design process called Think-Aloud Testing (Table 1), which asks participants to say what they are thinking as they go through an experience. This process allowed the HCD team to elicit participant thoughts about their experience at each step of the new health screening process, and identify successes and failures in the design.

Table 1 Human centered design activities and definitions

HCD activity	Sessions	Definition	References
Understanding activities			
Empathy-developing exercise	**Session 1:** Forming a comprehensive screening tool; **Session 2:** Incorporating IPV	Empathy exercises promote connection among participants to facilitate understanding of end-user needs. Examples include having all participants respond to the same question about a personal experience (joyful, motivating, inspiring, etc.…) and sharing personal stories	Giacomin (2014), Kumar (2013, p. 90)
Rose, bud, thorn	**Session 1:** Forming a comprehensive screening tool	This activity aims to analyze data or help understand where there are problem areas within an experience (such as health screening) by having participants identify positive elements (roses), areas of potential development (buds) and elements to avoid (thorns) using colored sticky notes	LUMA Institute (2012, p. 54), Merai (2015)
5 E's	**Session 2:** Incorporating IPV	The 5 E framework guides participants in designing products that are built from the perspective of the journey customer's journey through a specific experience, which in our example is a women's health screening. Elements of a "journey" include entice (what makes a person consider the experience), enter (what happens when the person initiates the experience), engage (what in the experience keeps the person engaged or focused on the experience), exit (what in the experience happens as the person is leaving), and extend (are there additional connections with the person after the person has formally left the experience)	Martin and Hanington (2012, p. 196)
Think aloud testing	**Session 3:** Prototype testing	In this activity, participants literally think out loud while they go through a mock experience, i.e. a health screening. The think-aloud activity often identifies typically unspoken thoughts that identify potential areas of success or failure in a process.	Güss (2018), LUMA Institute (2012, p. 20), Martin and Hanington (2012, p. 180), Vechakul et al. (2015)
Making activities			
Round robin	**Session 1:** Forming a comprehensive screening tool; **Session 2:** Incorporating IPV	A technique that helps generate ideas based on another person's perspective. The method is intended to generate concepts that are of value to someone else, which facilitates empathetic understanding	Kaplan (2007), Kumar (2013, p. 223), LUMA Institute (2012, p. 64)

Table 1 (continued)

HCD activity	Sessions	Definition	References
Concept posters	**Session 1:** Forming a comprehensive screening tool **Session 2:** Incorporating IPV	Concept sketches or posters help move participants from abstract ideas to concrete concepts by making participants think through the elements impacting the operationalization of the idea in the real world. Concept posters often help participants refine their ideas	Kumar (2013, p. 223), LUMA Institute (2012, p. 76)

Table 2 HCD participant demographics

Total participants	21
Gender	
Female	90.5%
Race/ethnicity	
Hispanic	9.5%
African American	28.6%
White	61.9%
Role/function	
Clinical	23.8%
Quality improvement	19.0%
Community	33.3%
Other staff	14.3%
Research	9.5%
Participation	
Three sessions	61.9%
Two sessions	23.8%
One session	9.5%

Iterative Refinement

The new screening tools and processes were modified based on the findings from the 3rd session. To gain additional insight, several members of the project team shared the tools with women inside and outside of the organization and recorded these women's reactions and thoughts. A clinical team from one of the implementation testing groups provided feedback on the work flow process and the tools.

Results

Participants

Table 2 presents characteristics of the 21 project participants. While most were female (90.5%), the racial/ethnic breakdown was more diverse with 61.9% White, 28.6% African-American, and 9.5% Hispanic. One-third were community members, 23.8% represented MAHEC clinical staff, 19% represented MAHEC quality improvement, 14.3% represented other staff positions, and 9.5% came from the research department. Overall, 61.9% of the 21 participants engaged in all three sessions, 23.8% engaged in at least 2 sessions, and 9.5% (who were all Hispanic) attended only the first session.

Session 1: Looking and Understanding

Using personal story telling, participants identified as many potential barriers to women answering screening questions as possible (Table 3). Several comments identified the asymmetry in power and knowledge that can lead to feeling

Table 3 Barriers to health screening (session 1)

Group list of barriers to women answering screening questions
History of forced sterilization programs
Health insurance access
Knowing the screener
Trusting that things are confidential
Will the screening information be used?
Feeling under attack—like a judgement, like I was the only one that needed this screening
A sense that no one can help you, why share?
A feeling of being rushed, don't want to be a burden
Is the provider only asking for a check box, to make money?
Tendency to give up on health system
Providers think you make up symptoms, convince or persuade providers that you have them
Providers make you feel like you are incapable of realizing when something is not right
Being judged about weight, race, gender, financial ability
Don't tell me to lose weight and don't tell me how to help—what are the standards?
Gender—weight, what are men supposed to look like vs. women
What women hear about losing weight—I need to look like a supermodel
Age—why are you having a baby at an "advance maternal age"
Being fussed at
Repetition of messages leads to disconnect

judged, as one participant said, "you can feel like the providers think your symptoms aren't real—that you're ignorant or incapable of realizing that it's your body and are capable of realizing something isn't right." Provider focus on a woman's weight was perceived to be judgmental as two women explained, "there is judgement about being overweight…being told about the need to lose weight doesn't help—there's a judgment… on your weight, your race," and, "it's the first thing they tell you—that you're overweight… by whose standards? Weight can't always be helped… or it's not the issue [for the visit], we don't have to be models. What are we supposed to look like?"

Results from the 16 rose-bud-thorn documents identified four themes: time, communication, judgement and trust. The notes highlighted specific questions participants felt could lead to being judged, or that would not be answered completely if a patient felt rushed or lacked trust in the provider. The round robin and posters also generated four themes: (1) how you initiate screening is important—screening can open up dialogue if done well; (2) not enough time to address presenting problems and discuss screening tools; (3) communication is lacking because there is not enough time to communicate properly; (4) there is a triangle of communication, time, and judgment. These themes appeared in the posters through the titles chosen by the participants (e.g. Triple T: time, trust and talk), and in the graphic depiction of a patient speaking to a doctor who was "all ears" with no physical barrier between them (Fig. 1c).

Session 1 highlighted a key concern that current screening is often conducted without enough time, resulting in rushed communication, which can reduce trust and lead to feelings of being judged. From these results the HCD team identified that how women's health screenings are initiated matters to whether the patient and provider can engage in open dialogue, and ultimately impacts the effectiveness of women's health screenings.

Session 2: Incorporating IPV

The second HCD session explored how to incorporate IPV screening into the overall women's health screening. After sharing thoughts and experiences with IPV screening, participants formed three groups to create posters using the 5 Es framework to shape a patient's experience. Table 4 summarizes the themes generated in the 5 Es posters.

Using the results from the first two sessions and personal observations, the graphic designer produced two prototypes: a post-card introducing physicians for new patients; and an engagement tool framed around the 5 Es to introduce the women's health screening topics (with the exception of intimate partner violence, which was excluded due to safety concerns about partners seeing the engagement tool). The HCD team vetted early prototypes for clarity, brevity, accuracy of materials, and potential to encourage dialogue with clinical staff. Figure 2a, b show the tool, which is intended to entice women to open the booklet, while the middle page acknowledges a women's power to choose what she will and will not share with the intent of encouraging the woman to enter into the topic of women's health. Information under each flap serves to prompt additional engagement.

Fig. 1 **a–c** Posters and themes for women's health screening

Table 4 Incorporating intimate partner violence screening (session 2)

5 Es	Participant comments and observations about incorporating intimate partner violence screening
Entice	Participants recommended sending new patients information about her doctor, such as brief professional and personal background, that would help develop a connection prior to the visit. Others mentioned the role of community support to identify the physician practice as a safe place
Enter	Provider offices need to be clear that what is said here, stays here. Having a sign on the wall stating a policy that partners will have to remain in waiting room for the first part of the appointment. The patient must also be greeted positively by all staff
Engage	Use a pamphlet to introduce different screening topics, and present information in a way so that she knows she is not alone. Have something to occupy any children in the event a woman screens positive. The physician must be compassionate and communicate that safety is a part of health
Exit	Set a follow-up appointment and/or create a safety plan. Communicate partnership
Extend	Refer to local agencies; make connections to agencies and community support if possible before ending the visit. Consider using home visits for follow up

Fig. 2 **a** Engagement tool (outside view). **b** Engagement tool (inside view)

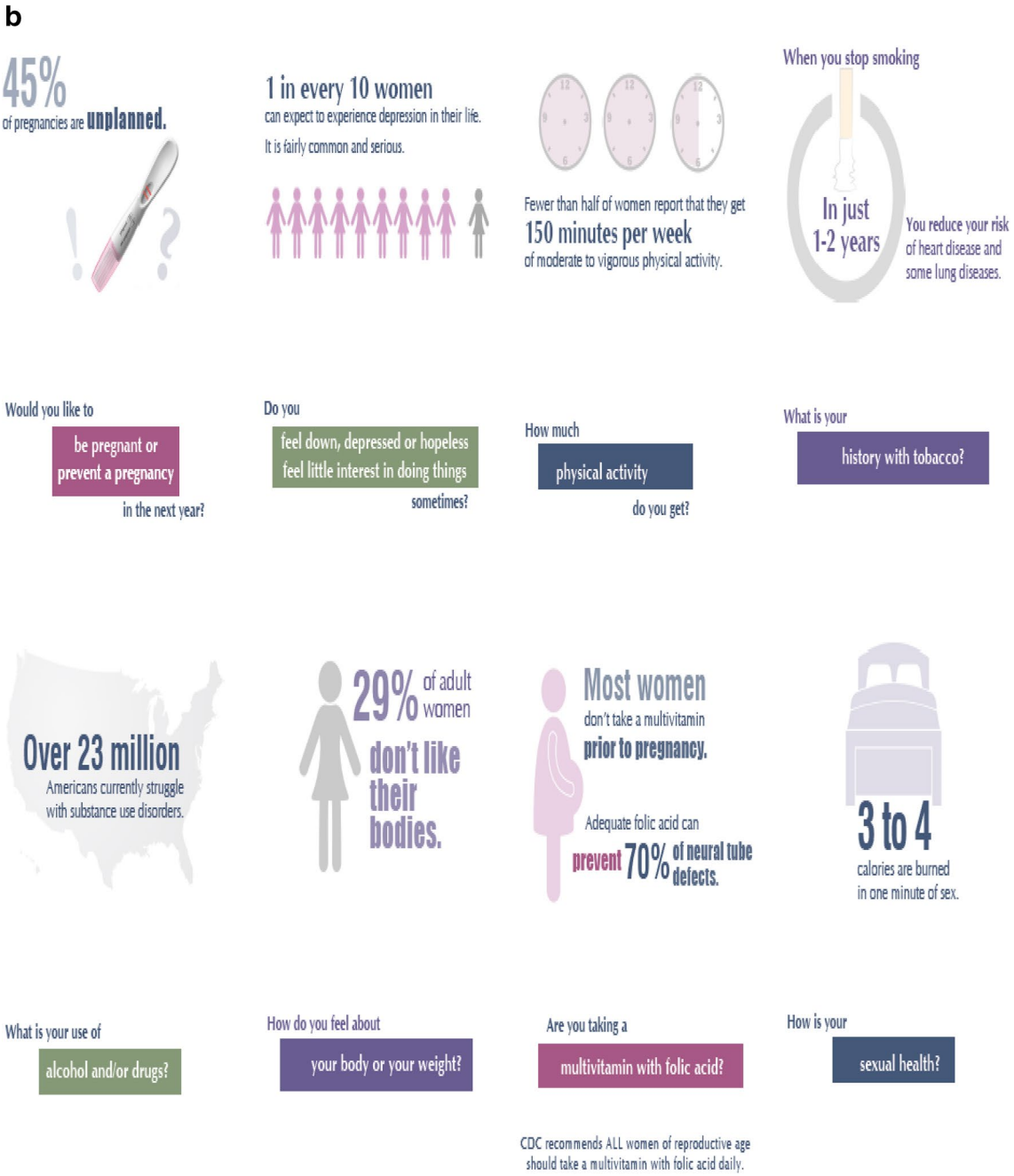

Fig. 2 (continued)

Session 3: Role Playing New Screening Process

The third session was devoted to role playing several mock screenings using the newly developed materials. The process began with check in, where the patient received a post-card with the physician's photo and professional and personal interests. A sign on the desk stated the policy that family and friends must stay in the waiting room for the first part of the appointment. Community members responded positively to the policy, saying, "This will give me relief, knowing he's not going to go back there with me. If I need help, maybe I need help at this moment. I'm in crisis. Maybe he just beat me in the car. This will be their relief." And "Men are very dominating, so having a sign [gives it authority] that it's a policy."

Table 5 Results of role playing for new screening process (session 3)

Results of role playing for new screening process using think-aloud testing
Ask the patient if she would like to complete the screening herself or verbally with the medical assistant
The picture postcard of the provider was very positively received
Minimize amount patient must read, fill out, etc. Too many forms causes patient burnout
Provide comfort tools (e.g. a blanket) when a woman discloses IPV—staff need to intentionally bring woman back from place of vulnerability
Safety is the most important message if woman reports IPV
Ensure resources are available and provided
Focus on communication-very important to have open relationship and talk about anything
New patient paperwork: make sure the same questions aren't asked on the intake form and again in the visit room
Have the sign saying the patient must come back alone for first part of the visit at the front desk and on the door heading into the clinic area
Don't assume everyone can read-Have front desk or medical assistant ask the woman- "do you have anyone with you today? Please, Know we will take you back without them and then come get them after the first part of your visit"

When escorting the patient to the medical rooms, the assistant stated again that the patient would come back alone for the first part of the visit. Once in the visit room, the medical assistant provided the engagement tool and allowed the patient a few moments to review it while he/she explained the importance of thinking about all aspects of a woman's health. During the experience, community members noted that "Every patient should get this book," and "The colors make me want to open it and read more."

Six Think-Aloud tests were completed across the three groups during the session. At the end, all participants were brought together and individuals were encouraged to share key learnings from the simulation exercises. A summary of the insights from session 3 are provided in Table 5.

Following the third session, the graphic designer produced the final screening tool (Fig. 3) which matches the engagement booklet in color and design, and has a background watermark of the woman's face that is on the booklet. The top of the screener repeats the statement from the engagement tool "I know I need to be healthy in mind, body and spirit to reach my goals" and adds the statement, "All of these topics are important for my total health."

Discussion

Despite broad recognition that screening for health behaviors and risks can play an important role in the health of women and their families (AAFP 2018; ACOGWPSI 2017; USPSTF 2018), standard implementation of health screenings can be challenging due to provider lack of time, resources and training (Miller et al. 2015). The variety of relevant screenings for particular patient populations such as women of child-bearing age, are often collected on separate forms, at different points in a woman's visit schedule (e.g. new patient, established patient, well child visit), and without consistent feedback to the woman. Incorporating IPV screening further requires careful thought about the process of screening from a woman's perspective to ensure that women feel safe during screening (Miller et al. 2015). Finally, little evidence exists about the validity of multiple health screenings that occur in combination with each other. Traditionally, new workflows, materials or designs are done without patient or staff input. After a design is created, focus groups are sometimes used to get feedback about the creation. HCD is a different approach allowing for patient centered design from the beginning (Chedid and Phillips 2018). The results of a HCD process may be very different from what a clinically focused approach would have created. We used HCD to bring together providers, clinic staff, community women and a design team to redesign our women's health screening process with the goal of creating new tools and processes for creating a safe and effective screening process.

Our community involved project not only produced an engaging and comprehensive women's health screening tool, but also provided multiple significant insights into how some women experience health screenings in primary care. Throughout the HCD sessions, community women, providers and clinic staff highlighted the impact of what they termed "Triple T: time, trust and talk" on the effectiveness of women's health screening. The amount of time providers have to spend with women during regular office visits is a structural constraint that a screening process may try to accommodate, but cannot change (Asche et al. 2017; Casalino et al. 2016). To the extent that time constraints limit providers ability to get to know their patients, screening processes may actually reinforce negative stereotypes which could contribute to disparities in health rather than ameliorate them.

Stereotype threat, a predicament in which individuals feel they may enter into an experience that validates a negative stereotype of a group to which they belong, is associated with delays in health care seeking among people

Fig. 3 Screening instrument

of color and may play a role in explaining disparities in women's reproductive health outcomes (Jones et al. 2013; Rosenthal and Lobel 2018). Women who need to see a doctor for a specific reason but believe they will be screened for things not salient to them in the moment and who fear being judged or stereotyped based on their income, color or other social status, may do whatever they can to avoid seeing the doctor at all. Our community co-authors are aware that many women try to self-treat because going to a doctor is not helpful or is redundant, especially when screening tools do not capture what is truly important to them. Women can sense provider time pressures, resulting in a check-box feel to most screening instruments which can leave a woman wondering whether their provider is truly interested in her.

Another important dimension to how screening may reinforce stereotypes that negatively impact health occurs when the screening process is deemed to create a brick wall from the patient's perspective, and there is a lack of time to deal with the woman's reason for the visit. The issue of weight screening,

for example, came up in several sessions. Our community co-authors explain that physicians frequently focus on their weight and other issues for which they screen positive, when weight and the screening items are not the reason for their visit. This emphasis on weight and other issues that are not the patient's priority can create a barrier between patient and provider if not done in the context of a trusting relationship. Furthermore, many women of color can feel that the doctor is not engaged in what matters to her, and rather than deal with her problem, reinforces the message of "you're a strong black woman, you can handle this [problem of yours]." This social construct of the 'strong black woman' has been shown to not only be associated with increased symptoms of depression and anxiety, but also creates an additional barrier to both seeking and receiving appropriate health care (Woods-Giscombe et al. 2016).

In interpreting the results of this work, it is important to acknowledge that four of our community partners and co-authors in this project had a shared background of living or having lived in local public housing, and all are of color. Two Spanish-speaking women were only able to participate in our first session. Several Caucasian clinic and project staff, however, participated in all three sessions, and shared their own personal experiences with women's health screening. Thus, while some of our findings may have greater relevance to health screenings with women of color than Caucasian and perhaps Spanish-speaking women, we believe their experiences are critical to capture especially since appropriately conducted women's health screening is intended to reduce health disparities.

Conclusion

Our co-designed women's health screening tool is a first step towards addressing screening barriers from both primary care provider's and community women's perspectives. Whether it will actually improve health outcomes for women and their families will depend on whether it helps women and their providers better connect to develop trust and open communication about what really matters to women. Future research with the newly developed tools and processes will explore the facilitators of and barriers to its implementation in different primary care settings. Future work should also more systematically examine whether and how screening processes may reinforce or contribute to women's feelings of being stereotyped, and how screening processes can be designed to avoid stereotype threat, which has the potential to reduce the effectiveness of screenings intended to promote women's health.

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Appendix

HARK questions—one point is given for every yes answer
H-HUMILIATION—within the last year, have you been humiliated or emotionally abused in other ways by your partner or your ex-partner?
A-AFRAID—within the last year, have you been afraid of your partner or ex-partner?
R-RAPE—within the last year, have you been raped or forced to have any kind of sexual activity by your partner or ex-partner?
K-KICK—within the last year, have you been kicked, hit, slapped or otherwise physically hurt by your partner or ex-partner?

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