Understanding Life Transitions: A Case Study of Support Needs of Low-Income Mothers

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ABSTRACT

Life transitions are an integral part of the human experience. However, research shows that lack of support during life transitions can result in adverse health outcomes. To better understand the support needs and structures of low-income women during transition to motherhood, we interviewed 10 women and their 14 supporters during the transition. Our findings suggest that support needs and structures of mothers evolve during transition, and that they also vary by socio-economic contexts. In this paper, we detail our study design and findings. Informed by our findings, we posit that all life-transitions are not the same, and that therefore, the optimal support intervention point varies for different life transitions. In this paper, we introduce a preliminary framework - the Strength-Stress-Analysis (SSA) framework - to identify optimal support intervention points during life-transitions.

CCS CONCEPTS

- Human-centered computing → HCI theory, concepts and models;  
- Applied computing → Health informatics;

KEYWORDS

Life transitions, Support interventions, Maternal health, Optimal Intervention Point, Motherhood, Strength-Stress Analysis Framework, SSA Framework

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1 INTRODUCTION

People experience multiple life transitions such as getting married, receiving a disease diagnosis, surviving violence, starting a new job, becoming a parent, and bereavement. For women, transitions are an integral part of their lives, mainly due to the biology unique to them as child bearers. Life transitions that only women go through, such as menarche, pregnancy, miscarriage, childbirth, and menopause, have profound implications for their physical and mental wellness. Among all the transitions a woman experiences in her lifetime, the transition to motherhood is arguably the most complex and consequential for her physical and mental health. This is especially true for low-income mothers. While adequate and timely provision of social support can act as a buffer against the negative consequences of poverty and stress in new mothers, the lack of support can amplify negative effects [19].

45% (5.2 million) of children under the age of three in the United States live in low-income families, and 23% (2.6 million) live in poor families. Of these families, 40% (3.5 million) are headed by a single parent, most likely the mother [12]. Even though a large percentage of mothers in the United States live in low-income households, support interventions that specifically address the unique needs and social network structures of low-income mothers in the United States are lacking. Technology designers often fail to include low-income population in the full spectrum of system development. This may lead to designing technologies that are irrelevant, inaccessible, or ineffective for low-income mothers. In some cases, published studies on maternal support interventions do not include socio-economic information such as income or educational attainment of the participants [2, 11].
Additionally, some studies that seek to understand the support needs and support structures of new mothers do not include supporters’ perspectives. In order to address this, our study included pregnant women as well as their supporters. We conducted semi-structured interviews (43 total), with 10 pregnant women and 14 of their supporters during the third trimester of pregnancy and after childbirth. To better understand the social contexts, including interactions with family members, living arrangements and people in their daily lives, whenever possible (based on participants’ convenience), we conducted the interviews at their current place of living. We are not aware of any qualitative support assessment studies conducted by HCI researchers on pregnant women and their supporters, both antenatally and postnatally.

We found that low-income mothers have localized, resource-restricted, and fluctuating support networks, all adverse conditions less likely to affect their higher-income counterparts. Additionally we found that participants’ marital status, living arrangements, and the characteristics of their support networks influenced the types of social support they need. We also found that women’s support needs and support structures evolved as they went through different phases of transition. Thus our findings suggest that one-size-fits-all approaches to investigating support needs during life transitions are not sufficient to address the wide diversity in life transitional experiences. Informed by our findings, we posit that all life transitions are not the same, and therefore designers of support interventions for life transitions need to attend to the whole landscape of people’s experiences during different life transitions. The optimal support intervention point may vary for different life transitions. However, there are no tools currently available to identify it. To this end, we also introduce a preliminary framework - the Strength-Stress-Analysis (SSA) framework - to help identify optimal support types and intervention points during different life-transitions.

In this paper we:

1. discuss the details of our research method by which we engaged low-income pregnant women as well as their supporters in research activities during pregnancy and after childbirth;
2. present findings regarding the network characteristics and common stressors of low-income mothers as they transitioned to motherhood;
3. discuss different phases of transition and how the support needs and support structures of women evolved as they transitioned through different phases of transitions; and
4. propose a preliminary framework, the Strength-Stress-Analysis (SSA) framework, to help identify optimal support intervention types and intervention points along the arc of different transition phases.

2 RELATED WORK

To situate our research, we first consider relevant prior research in such fields such as Human-Computer Interaction (HCI), social sciences, and cognitive psychology regarding the role of social support in the wellness of women transitioning to motherhood. We then consider prior research regarding phases of life transitions and potential applications for transition to motherhood. We also survey prior technology interventions targeted for low-income mothers.

Social Support During Transition to Motherhood

The well-being of new mothers and infants determines the health of the next generation. The amount of support a woman receives during her transition to motherhood affects her physical and mental health. Many researchers identify social support as one resource that has been shown to be effective in helping women cope with a range of stressors following childbirth [3, 6, 26]. New mothers who lack adequate support have a higher risk of developing postpartum depression (PPD) [18]. 15-20% of new mothers (approx. 600,000) in the United States are diagnosed with PPD every year and many more go undiagnosed. Behavior problems among young children and adolescents are strongly associated with maternal poverty, but interact with several other characteristics found among women living in poverty, including lower education, poorer maternal health, marital conflict, one-parent households and the greater likelihood of such health risk behaviors as smoking[13, 22]. Nuckolls et al. found that women with low social support and high stress suffered more complications than women with high stress but high social support [19]. Access to social support and interactions has been linked to better maternal-child health outcomes [15]. Previous studies indicate the evolving nature of the support needs of new mothers as they transition through pregnancy, delivery, and new motherhood, and frequently, subsequent pregnancies [21]. Therefore, it is important to better understand this transitional event to design appropriate intervention types and intervention points as women transition to motherhood.

Life Transitions

Some researchers have positioned life transitions within the developmental framework, viewing them as turning points [14]. Such turning points can bring about changes in relationships, routines, roles and wellness. Transitions can be part of the natural life course, or brought about as a result of a planned or unplanned event or a crisis. In any event, transitions present unique challenges along with opportunities
for growth and transformation [7, 24]. William Bridges conceptualized the transition process as having three phases: endings, neutral zones, and beginnings. While the “beginning” of a transition, such as becoming a new mom or starting a new job, seems obvious, bridges argues that every transition, every beginning, starts with ending [8], the ending of a prior life style or circumstances. The neutral zone is like a “gap year” between graduation and employment, a period between the old life and the new life, having left old roles, relationship routines, and assumptions. Beginning comes when the endings and the neutral zone are finished [8]. Bridges’s conceptualization of the transition process having three phases fits well with the phases women go through - pre-pregnancy life, pregnancy and new motherhood - as they transition to motherhood. Such parallels can be also drawn in other transitions, such as disease diagnosis, bereavement or getting married.

In HCI, there is a growing body of research on various life transitions such as death of loved ones [16], relationship breakdown [10, 17, 23], and divorce [20]. It focuses on varied aspects related to life transitions. Herron et al. explored individuals’ experiences with relationship breakups, and their attitudes towards digital possessions emanating from those relationships [10]. Odom et al. [20] explored the potential ways in which interactive systems might be better designed to address the issues faced by divorced families. Moncur et al. studied the role technology plays after End of Life (EoL) and the problems associated with it [16].

### Interventions for Low-income Mothers

Multiple studies conducted by ICTD researchers engaged pregnant women and new mothers from low-socioeconomic status in the design and development of socio-technical systems. To help reduce maternal fatalities in rural areas in Pakistan, Abid and Shahid developed an Interactive Voice Response (IVR) system for mothers that provides essential information and recommendations and helps improve routine visits with doctors [1]. Sorathia et al. conceptualized a gesture-based TV program, Chetna, to provide health information to pregnant women in rural Assam, India [25]. Kumar et.al deployed Projecting Health, a public health initiative they deployed in Uttar Pradesh, India to target the dissemination of health information for mothers and new-borns. While there are many efforts by non governmental agencies and international organizations that focus on the needs of under-served pregnant women and new mothers in resource restricted countries, such concerted effort is lacking in designing for low-socioeconomic-status women in the United States.

### 3 METHOD

In this section, we provide detailed information on recruitment methods, participants and research procedure.

#### Recruitment

After getting approval from the Institutional Review Board (IRB), we recruited pregnant women who were in their third trimester of a first pregnancy and their supporters. To be included in the study, the women had to have at least one supporter willing to participate in the study. We posted recruitment flyers at an OB/GYN doctor’s office and at local Women, Infants and Children (WIC)1 offices, on our personal Facebook pages and on Twitter. Nine pregnant women and a boyfriend of a pregnant woman who did not have her own phone contacted us to express interest in the study. We also confirmed that all the pregnant women had supporters willing to participate in the interview.

<table>
<thead>
<tr>
<th>Pregnant Mothers</th>
<th>Supporters</th>
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<tbody>
<tr>
<td>N=10</td>
<td>N=14</td>
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<tr>
<td>Pre-birth</td>
<td>Post-birth</td>
</tr>
<tr>
<td>Mom1(M1)</td>
<td>Grandmother(M1S1)</td>
</tr>
<tr>
<td>Mom2(M2)</td>
<td>Boyfriend(M2S1)</td>
</tr>
<tr>
<td>Mom3(M3)</td>
<td>Mother(M3S1)</td>
</tr>
<tr>
<td>Mom4(M4)</td>
<td>Mother(M4S1)</td>
</tr>
<tr>
<td>Mom5(M5)</td>
<td>Mother(M5S1), Boyfriend(M5S2)</td>
</tr>
<tr>
<td>Mom6(M6)</td>
<td>Mother(M6S1)</td>
</tr>
<tr>
<td>Mom7(M7)</td>
<td>Boyfriend(M7S2)</td>
</tr>
<tr>
<td>Mom8(M8)</td>
<td>Husband(M8S1)</td>
</tr>
<tr>
<td>Mom9(M9)</td>
<td>Husband(M9S1)</td>
</tr>
<tr>
<td>Mom10(M10)</td>
<td>Husband(M10S1)</td>
</tr>
</tbody>
</table>

*Interviews=10  Interviews=9  Interviews=12  Interviews=12

<table>
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<td>Mom4(M4)</td>
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<td>Mom5(M5)</td>
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<td>Mom6(M6)</td>
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<tr>
<td>Mom9(M9)</td>
<td>Husband(M9S1)</td>
</tr>
<tr>
<td>Mom10(M10)</td>
<td>Husband(M10S1)</td>
</tr>
</tbody>
</table>

Table 1: Interview Participants and Number of Interviews.

Total Number of Participants= 24, Total Interviews Conducted= 43 (*lost contact with M2 after childbirth).*

#### Participants

There were 24 participants in the study, ten pregnant women, hereafter referred to as “Mom” or M1-M10 and 14 supporters, hereafter referred to as “supporter” or S1-S14. Table 1 lists the participants we interviewed during the third trimester (pre-birth) and/ or after the child’s birth (post-birth). Some supporters that we interviewed during the pregnancy were not available after delivery for various reasons; in some cases we interviewed new or alternate supporters after the delivery. Table 2 shows the demographic details of the pregnant participants. Three out of 10 pregnant women were married and 7 were unmarried. Participants’ ages ranged from 18 to 32 years. Six of the supporters were mothers or mother

Mothers (M) (N=10)

<table>
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<tbody>
<tr>
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<td>No</td>
<td>No HS</td>
<td>24</td>
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<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Grandmother</td>
</tr>
<tr>
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<td>No HS</td>
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<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Boyfriend, Father-in-law</td>
<td>Yes</td>
</tr>
<tr>
<td>M3</td>
<td>No</td>
<td>HS</td>
<td>18</td>
<td>White</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Mother</td>
<td>Yes</td>
</tr>
<tr>
<td>M4</td>
<td>No</td>
<td>No HS</td>
<td>23</td>
<td>White</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Boyfriend, Brother-in-law, Roommate</td>
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</tr>
<tr>
<td>M5</td>
<td>No</td>
<td>No HS</td>
<td>18</td>
<td>White</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Boyfriend, Mother</td>
<td>Yes</td>
</tr>
<tr>
<td>M6</td>
<td>No</td>
<td>No HS</td>
<td>19</td>
<td>White</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Friends, Older adult</td>
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</tr>
<tr>
<td>M7</td>
<td>No</td>
<td>No HS</td>
<td>18</td>
<td>White</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Mother, Step-dad</td>
<td>Yes</td>
</tr>
<tr>
<td>M8</td>
<td>Yes</td>
<td>Bachelors</td>
<td>26</td>
<td>White</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Husband</td>
<td>Yes</td>
</tr>
<tr>
<td>M9</td>
<td>Yes</td>
<td>Masters</td>
<td>32</td>
<td>Asian</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Alone</td>
<td>Yes</td>
</tr>
<tr>
<td>M10</td>
<td>Yes</td>
<td>Masters</td>
<td>32</td>
<td>Asian</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Husband</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Table 2: Demographic Information of Pregnant Mothers. This Information was collected during the first interview (in the third trimester of pregnancy). The living arrangements of some of the participants changed after the delivery figures, three were boyfriends, three were husbands, one was an aunt and one was a wife. All pregnant women except for M2 were interviewed pre- and post-birth. Participation in WIC services was used as a proxy for low-income status. All mom participants in our study were recipients of WIC services.

In total, there were 43 interviews, 22 before delivery and 21 after delivery (Table 1). Compensation of $25 was given to the participants after each interview.

Procedure

Participants signed the informed consent in person at the first interview. All participants completed a demographic survey and Edinburgh Postnatal Depression Scale. Semi-structured interviews allowed us to combine a predetermined set of open questions that prompted initial discussions with the opportunity to explore particular themes or responses further. It allowed new ideas to be brought up during the interview as a result of what the interviewees said. We used the following 4 interview schedules:

- During pregnancy (Mothers)
- During pregnancy (Supporters)
- After childbirth (Mothers)
- After childbirth (Supporters)

Mothers’ interview schedules were loosely divided into the following areas: providers of support, pregnancy/motherhood experiences, support needs, support challenges, and worries. Supporters’ interview schedules included the following areas: supportive behaviors and interactions with the mother, and attitudes toward new mothers’ support needs.

Although we used the interview schedules to ensure coverage of relevant areas, participants’ responses guided the flow of the interview. Interviews lasted from 20 to 40 minutes and were audio-recorded and transcribed verbatim. All interviews were conducted in person by the first author.

4 ANALYSIS

We used thematic analysis driven by grounded theory [9] for data analysis. This process involved the review of the research data to determine appropriate coding and the formation of themes from those codes. We conducted thematic analyses on the transcriptions of participants’ responses to interview questions [5]. First we conducted open coding of the study data, where the researchers closely read the texts of the interviews, labeled concepts, and developed categories and themes [4]. The same researchers coded the same data to keep bias at a minimum and to allow for different ways to analyze the data. During the axial coding phase, the researchers related similar themes and concepts to come up with the initial codebook. Then we related the themes to different phases of transition to motherhood. After multiple iterations, we finalized the codebook for the data analysis. The agreement among the coders was confirmed by the inter-coder reliability score of >.79.

Dedoose 3, a qualitative data analysis software program, was used to organize and analyze the collected interview data.

5 FINDINGS

In this section, we discuss the findings from the study. We will refer to the mom participants as M1–M10 and the supporters as MnSn (Mother Mn’s Supporter Sn, e.g., M2S1 means supporter 1 (S1) of Mom participant 2 (M2)).

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3www.dedoose.com
The Turning Point/ Endings

Even though the first interview was conducted during the third trimester of pregnancy, participants shared with us their own reaction, as well as the responses of people in their social network, to the news of pregnancy. Six out of 10 low-income pregnant participants reported their pregnancy to be unplanned. So it was not surprising that they got mixed reactions from their partners, family and friends.

M5: “I was kind of shocked. I didn’t really believe it at first but then I told my mom, I told my boyfriend and talked to my family and they were all fine with it—just happy. Mom was not really upset, more disappointed. Just wishing I would’ve waited.”

M2’s boyfriend (M2S1) described how M2 felt when she found out she was pregnant.

S1: ‘She cried a lot because she felt like she was going to fail for the first few months and stuff. She was worried about how she was going to be when the baby came out. She thought she was going to be a lousy mother, or she wouldn’t be able to give it the life she wanted it to have.”

Several participants had the high expectation that their unborn child would make them happy and give their lives new purpose.

M4: “I feel like taking care of the baby would be the only thing to make me happy. I mean, as a mom I feel like I’m gonna be a good mom. I feel like I have a purpose now.”

M1: “I just see myself being happy again. Finally got a meaning to life again. Give me someone to love, I won’t feel alone. Never have to feel alone... I’ve got someone who will love me forever, my little buddy.”

For some, pregnancy was a turning point that forced them to leave behind risky lifestyles and habits, including smoking, alcohol or drug (ab)use.

M3: “I’m so excited. I can’t wait. I was kinda in a drug problem and stuff so whenever he came around, it changed everything for me. I feel like he kinda saved my life, really. Yeah, he saved my life. I’m happier, I’m more myself again. I like it. I have my days, but he’s so worth it.”

For many of the unmarried participants, pregnancy marked the end of their current life styles, friendships, and social relations.

M5: “I used to be in a bad crowd of friends and stuff like that and now I barely talk to any of them, I just stay home. I do what I need to take care and be healthy for him and I don’t worry about anyone else anymore. I just stay home and I’m not out doing dumb stuff with my friends anymore, I just stay home.”

Supporters also shared how their lives and responsibilities have changed. Since her Mom was unhappy with her pregnancy, M2 moved in with her boyfriend at his grandfather’s home. It added stress on boyfriend as a sole caretaker and supporter of M2.

M2’s boyfriend (M2S1): “It’s kind of hard. You know, I feel like I’m the only one who’s really there for her like sometimes. I know there’s other people that say they’re there to help but I feel like when it really comes down to it they’re really not. Since I’m doing everything I’m just stressed sometimes.”

Married women with an education higher than High school did not experience drastic changes in their relationships or social structures throughout the transition.

Challenges/ Stressors in the “Neutral Zone”

Pregnant women in our study faced multiple challenges, in the “neutral zone” - the period between pregnancy and childbirth. Unlike the married women in our study, unmarried women had to cope with additional stresses due to uncertainty in living arrangements, transportation, addictions, and strained relationships. The following sections highlight their support realities, including the challenges they faced.

Prevalence of Addiction and Depression. Five out of seven unmarried participants in the study had a history of depression before pregnancy and were taking an antidepressant. Some stopped taking antidepressants when they got pregnant. While some continued without medication after delivery, others were put back on antidepressants.

M7: “I had a really rough childhood cuz her [mother’s] husband was mentally abusive, so I watched her getting abused growing up, and kind of it all. She’s still with him. He still abuses her; that’s why I don’t really stay there.” M7 also shared that she started smoking when she was 13 (she was 18 at the time of the study).

M3 stopped using antidepressants when she got pregnant. However, she says her doctor put her back on them during pregnancy.

M3: “I quit whenever I got pregnant. They told me it was healthier to take it instead of being depressed and not sleeping. That was mostly because I was having nightmares and stuff.”

After delivery, her social worker diagnosed her with depression during the home visit, and advised her to go on stronger medication.

Smoking was also prevalent among the participants (6 out of 10), though some tried to quit during their pregnancy.

M1: “As soon as I found that out [I was pregnant] I stopped [doing drugs]. I haven’t done them since. I stopped smoking, so that’s good. That’s about it.”
Participant M6, who was 19 years old reported that she continued smoking following doctor’s advice.

M6: “I was told I can’t stop smoking because I’ve smoked through my pregnancy. I’m not allowed to stop. My doctor won’t let me. Because I smoked during my whole entire pregnancy and if I stop now, it could harm the baby. I didn’t even know that until my doctor told me.”

Living Arrangements. Table 2 shows the living arrangements of our mom participants at the time of the first interview. In addition to the people listed in the table, there were additional transient family members or friends living with unmarried pregnant women. For example, M1 lived with many other family members in her grandma’s house.

Participant M6 was living with friends, even though she came to her Mom’s house for the interview. She explained her housing dilemma:

M6: “Currently I live with my friend. I just moved in there. Cuz I couldn’t stay here [Mother’s apartment]. This is a 5-person lease and when my baby is born it will be six... so I had to find someone to stay with until I can get my own place.”

Some of the women planned to continue with their current living arrangement, and others planned to apply for Section 8 housing from the US Department of Housing and Urban Development (HUD)⁴. Others planned to live with friends.

Unreliable Partner Support. In a new mother’s support network, the role of a partner is significant. During the first interview with some unmarried women, we sensed volatility in their relationships.

M5: “He was horrible. When we would get in fights I was everything in the book and I was nothing. He don’t do that no more though, that’s a plus. When we got into fights or whatever, he’d message other girls.”

While pregnant, M1 talked about how her boyfriend was supportive of her. When we met her for the second interview after the childbirth, we learned that her boyfriend was in jail.

M1: “He’s in jail right now. He got a drug charge. We have a no contact order because of everything. It is stressful but I try not to let it affect me... We just deal with it. It’s not his first time in jail, I know that sounds bad but I’m just used to it.”

M1 said that she is now on PPD medication, partly due to the stress of her partner’s incarceration.

Lack of Reliable Transportation. Participants shared their difficulty in getting rides to doctors appointments and even in emergency situations. M2 or her boyfriend did not have a vehicle of their own. M2S1 shared a rather harrowing situation they faced without a reliable transportation.

M2S1: “We were at my dad’s house because my dad went to work he said we could stay there for the night. We were just sitting and hanging out and having fun and she started spotting and started having really bad stomach pains. So, we called her mom because we didn’t know what to do. Her mom said walk to the hospital.”

They said they had to wait until the morning to get a ride.

The New Beginning

For many low income unmarried mothers, the new beginning as a mother presented many challenges some expected, others unexpected. They encountered difficult situations including recurrence of depression, financial worries, uncertainty in living situation, loss of friendship, and broken relationships. When we reached out to S2 for the second interview, he said he and M2 are not in contact anymore and he did not know her contact information. As he was our primary point of contact for M2, who did not have her own phone or address, we could not contact her for the second interview.

During the first interview, pregnant mothers also highlighted positive aspects of their relationships with their partners. However, the pregnant women’s other supporters, mainly mother figures, did not always share their positive opinions. This shows the importance of including pregnant women’s supporters in studies of postpartum support.

M5S1(Grandmother): “She [M5]’s feeling good. I just don’t like the way he [M5S2] -boyfriend- aggravates her and gets her upset. I don’t agree with a lot of things he says to her and does to her. He’ll just aggravate her with anything and everything he can and she puts up with it.”

All the married pregnant women we interviewed considered their partner as the primary supporter. Most unmarried women highlighted the positive aspects of their relationship with their partner during the first interview, but after the delivery, in many cases they had unfavorable experiences and opinions to share about their partner’s support or lack thereof.

For example, during the first interview M7 said the following about her boyfriend.

M7: “He is very good with emotional support. He provides for us financially, he always makes sure if he can tell I’m not feeling okay he’ll talk to me. He’s good about talking.”

Her grandmother also had good things to say about him.

M7S1(Grandma): “Oh yeah, definitely. He’s real supportive of her. They’re just young. That’s the only problem. They’re so young and they’ve got a lot ahead of them. He’s very good to her. She kind of rules mostly.”

⁴https://portal.hud.gov/hudportal/HUD
M7 and her boyfriend broke up after the baby was born. During the second interview her grandma had a different opinion about M7’s ex-boyfriend.

M7S1: “I don’t even want him to come here. He’s doing things he shouldn’t be doing and he’s belittling her. I don’t want to sound mean, but he’s not helped with the baby.”

Along with fluctuations in their support system, participants (particularly the more vulnerable unmarried teens) also experienced turmoil and conflict among their support network.

Financial Worries. Financial difficulties were a major cause of concern for our participants. During the first interview, M3 was working part-time, earning minimum wage.

Even though she expressed her desire to be financially independent, the reality was that after childbirth she stopped working and had to ask her mom for money, which caused tension between them.

M3: “I asked her [mother] for money for today for food and she was like... I don’t know why it’s a big deal. They know I don’t have an income right now.”

Participants also expressed that they had social support from people around them, but that did not always translate into access to more resources.

M4: “I have people but I don’t have money. I don’t like that I can’t get him [newborn] what he wants and what I want to get him anyways. That’s my only real thing [worry].”

Six out of ten women in our study did not have a high school degree which makes it difficult to find a well-paying job to alleviate their financial worries.

Duality of Family Support. Inclusion of supporters in the study enabled us to understand their viewpoints and thus a better assessment of the support reality. For some women in our study, families have been sources of both positive and negative experiences.

M2S1 (Boyfriend): “If she’s around people who argue with her too much or get too loud then it stresses her out and puts strain on the pregnancy. So she’s having to watch that. It got a little worse after she got bedridden and stuff.”

M1: “My aunt has been one of my biggest problems.... She stresses me out horribly!”

Some felt they could depend on family.

M5S2 (Boyfriend): “If we need any help, if it actually comes down to it, yeah. If I have to I will ask my grandparents and mom for any help that we need.”

They also faced emotional turmoil due to conflicts with family members.

M2: “There’s some family members who said I wasn’t gonna be able to do it and that I was gonna fail. I was gonna be a bad mom.”

Unmarried mothers’ support networks fluctuated as they transitioned from pregnancy to motherhood. Some broke up with their partners, some lost support from other supporters, and some gained new supporters to fill the support gap. The unmarried mothers in our study had multiple people (such as mother, grand mother) living with them; however, these individuals had limited resources to offer.

Loss of Friendships. Pregnant women discussed changes in their social lives during pregnancy and after the birth of the baby. Several described losing friendships, or not being able to take part in the social life of their peers. Some mothers did not feel like reaching out to friends and families.

M4: “I had friends before I got pregnant, but when I got pregnant and at first when they found out “oh, I’m so happy for you I’m gonna be auntie dadada” then they just left. They don’t talk to me anymore.”

M8: “Social life is kind of nonexistent. Even if I want to go out I can’t really tell them what time because he might be asleep then or I might feed him at that time or he might be fussy. Social life, not happening.”

In some cases loss of friendship helped them stay away from unhealthy behaviors, but in other cases it also led to feelings of social isolation.

6 DISCUSSION

Our research with pregnant women and supporters which spanned pre- and post-natal periods brought to light the diversity and fluidity of support needs and structures as women go through the transition to motherhood. We found that pregnant participants’ socio-economic realities such as marital status, availability of reliable transportation and stable living arrangements, mental health, financial status, education level, and employment, affected their overall wellness and need for support.

Our study confirmed a finding from a previous study that reported the evolving nature of support needs and support structures during the transition to motherhood [21] and points to the need to consider life transitions as comprised of stages rather than a single event. Such an approach can help designers identify optimal support intervention points during life transitions. We envision an optimal support intervention point as a combination of optimal timing of the intervention (supportive intervention in the most stressful phase, or preventive intervention during transition to a potential harmful state) and the optimal type of the support intervention needed (essential support). For example, for a person receiving a cancer diagnosis, informational as well
as emotional support may be of utmost benefit in the beginning phase of the transition, while the cancer patient may need more physical (instrumental) support during chemo or radiation therapies. A woman navigating an unplanned pregnancy who also has a history of depression may need emotional as well as medical support in the beginning, and enhanced social support after childbirth.

In order to identify the optimal intervention point, the designers need to answer the following key questions:

(1) Where in the life transitional arc is a support intervention most needed and can potentially be most effective? 
(2) What types of crucial support are lacking in specific phases of transitions?

We looked for tools, techniques or frameworks to help answer these questions based on our data. Unfortunately, we were unable to find any. This motivated us to work toward developing a framework to identify optimal support intervention points during life transitions.

To answer the first question, it was imperative to identify the support needs in different phases of the transition. In order to allow designers to closely investigate different phase of transition based on Bridges’ [8] three phases of transition (ending, neutral zone, beginning) we propose more generic "phases of transition". They are pre-transition, in-transition and post-transition as shown in Figure 1. Partitioning life transitions into three distinct phases allows for closer investigation of the support needs and structures specific to each phase. To answer the second question, designers have to identify various elements of support that are helpful to a person going through transitions; we call these strength elements. Strength elements are helpful resources and attributes that support the person or the group as they traverse the transition phases. Based on our study findings, elements such as mental health status, education level, and employment can be considered strength elements.

To help identify the optimal support intervention points during life transition, we propose a framework, the Strength-Stress-Analysis (SSA) Framework for life transition support (Figure 2), consisting of phases in transitions and context specific strength elements of support.

**Figure 1: Transition Phases**

**Figure 2: The Structure of Strength-Stress-Analysis Framework for Life Transition Support**

Helpful resources in the first column are rated in three phases of transition to find optimal intervention points.

**Strength-Stress-Analysis Framework for Life Transition Support**

The proposed Strength-Stress-Analysis (SSA) framework (Figure 2) is a context-relevant tool to identify the optimal support intervention points for an individual or a group going through life transitions. In this framework, strength elements are helpful resources and attributes that support the person or the group as they traverse the transition phases. Through needs assessment studies, researchers can qualitatively or quantitatively rate each strength element in a range from low to high in each phase of transition. This approach gives a visual representation of strengths and stressors. For the purpose of this framework, we define stress as the absence of strength. The greater the plotted area of a strength element (strength area), the more support the person or the group already has. The greater the plotted stress area in one transition phase, the more support the person or the group needs in that phase. As shown in the SSA template (Figure 2), if a post-transition phase has more stress area, then this phase may be a good candidate for introducing support intervention. In this figure the strength element 1 is gradually diminishing, so it might be appropriate to deploy a preventive intervention to improve this support element during the transition.

**Sample Application of the SSA Framework for Transition to Motherhood**

In order to demonstrate the potential use of the SSA framework to identify optimal support intervention points, we used a subset of the demographic information (Table 1) and support factors identified by the thematic analysis of our interview data as strength elements (Figure 3). These are grouped under the broad categories of wellness and resources, and are representational strength elements, not an exhaustive list. We are using objective judgment to assess the relative strength of the elements. A larger stress area in Figure 4 indicates an increased support need for this population.
From Figure 4 one can infer that depression was prevalent throughout the transition. This information helps to identify the in-transition (pregnancy) phase as an optimal preventive intervention point to prevent postpartum depression.

The SSA framework can be applied to find optimal support intervention points for an individual or a group. It can also be applied to identify both (optimal) preventive and supportive intervention points. It can also be used to visualize actual or perceived provisions of support. Researchers can use qualitative as well as quantitative measurements of strength elements as measures of strength across transition phases.

7 LIMITATIONS
There were no African American or LatinX participants in our study, due to the fact that we recruited the participants from a rural county (Lawrence) in Indiana, the population of which is mostly white. According to the website https://factfinder.census.gov there are are only a handful of low-income minority residents in this county. Therefore, we do not expect the specific results about the experiences of our population (low-income rural women) to generalize to women in other cultures or even other socio-economic-status, but we wanted to bring attention to this specific design space (support intervention design for life transitions) within the larger support intervention design space in HCI.

Seven out of ten mom participants were unmarried, and only three were married. We did not anticipate the drastic difference in the support needs and the support structures of these two categories. Indications of these differences emerged only during the data analysis. However, the 43 interviews we conducted allowed us to reach data saturation, with most of the themes emerging after we interviewed just six pregnant women and their supporters. We recognize that our results may not generalize to a larger population of pregnant women, and we encourage the HCI community to replicate this study and contribute to the refinement of the framework we proposed.

8 CONCLUSION
In the study presented in this paper we investigated the support needs of low-income women as they transition to motherhood. Based on our findings, we posit that a close investigation of each phase in life transition may help future designers of support interventions to identify optimal support intervention points. Acknowledging the lack of appropriate tools and techniques to identify optimal support intervention points during life transitions, we presented the Strength-Stress-Analysis (SSA) framework as a first step toward building tools and techniques to identify optimal support intervention points in this design space.

We believe that the proposed SSA framework is flexible enough to apply to other life transitions as well. We encourage the HCI community to explore and contribute to refinement of this framework by applying it in varied life transitions.

REFERENCES


