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Who Participates in an Internet-Based Research Program for Mothers of Infants? A Secondary Prevention Research Study Among Low-Income Families

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Mother-Infant Relationship

Research has demonstrated the positive impact of parent sensitivity and responsiveness on infant cognitive, social-emotional, and language development as well as subsequent risk mitigation.^{1,2} In contrast, research has demonstrated the negative impact of adverse infant-parent interactions on infant socio-emotional difficulties and subsequent internalizing and externalizing disorders.^{3,4} Promoting parent sensitivity and responsiveness are crucial aims and outcomes of parenting interventions designed to foster the behavioral foundations of infant mental health (eg, infant social-emotional competencies comprised of emotional regulation skills of self-soothing, emotional expression through clear signaling, and behavioral organizational skills of sustaining and shifting visual attention)⁵.

Interactive Internet-Mediated Interventions for Parent Training and Support

With the dramatic increase in the use of computer technology in the everyday lives of individuals, the potential to deliver Internet-based interventions and online support services has burgeoned. Internet-mediated interventions and assessments have become feasible due to the wide penetration of Internet access. In 2013, estimates indicated that 86%

of the adult population in the US used the Internet, with similar rates of use reported between men and women (i.e., 86% and 85% respectively),⁶ Moreover, Internet use is rapidly crossing key demographic thresholds. While a digital divide continues to exist for those who are poor and are of non-majority status, evidence suggests that this divide is shrinking.⁷ Recent estimates also indicate that 83% of Spanish-speaking adults use the Internet.⁶ Age consistently appears to be a critical factor in the likelihood for Internet use with only 59% of those greater than 65 years old being online. Therefore, the younger populations of women with infants are likely to have a higher rate of acceptability with Internet-based interventions.

Computers and the Internet have increasingly been used to promote behavioral goals,⁸ including programs aimed at reducing child maltreatment risk⁹ and improving parenting.¹⁰ The Internet has many advantages over traditional approaches to delivering behavior change programs.^{9,11,12} One of the principal advantages of technology-based delivery mechanisms, as compared to traditional approaches, is that they may dramatically increase potential for intervention reach. This is a particularly important concept to consider in light of striking public health evidence that has shown that population impact of intervention can be powerful when penetration of delivery is wide, even when effect sizes are

small.¹³ Factors likely to contribute to improved reach of Internet-based interventions include the following: (1) accessibility, (2) cost efficiency, (3) amenability to and flexibility of individual implementation, and (4) more structured intervention integrity. With regard to accessibility, Internet-based interventions permit 24-hour access, can be accessed from various settings (eg, homes, hospitals, schools, and libraries), and can readily be provided in multiple languages, improving accessibility for linguistically diverse populations. In terms of cost-efficiency, Internet-based interventions eliminate monetary and time costs associated with travel to and from service settings, a significant savings over home-visiting approaches, especially in rural and remote locations. Internet-based intervention programs also allow for relative ease of, and flexibility in, individualizing program implementation to address the needs of various users (eg, customization of audio and visual text displays; completion of sessions at times convenient to the individual). Finally, with regard to intervention integrity, Internet-based formats are structured and consistent in their presentation, thus helping to ensure accuracy and completeness of program content presentation and avoiding implementation fidelity problems that often ensue due to lack of interventionist adherence to treatment protocols within traditional delivery settings.⁹

Research on the application of interactive, Internet-mediated interventions for parenting support and information has been conducted on several programs with promising results.^{10,14-19} The networks ranged in complexity from simple networked terminals and personal computers with animated graphic interfaces to the remote transmission of video. Results of the pilot studies above serve to illustrate the feasibility and potential efficacy of interactive Internet-mediated interventions to increase the reported use of effective parenting behaviors and decrease parental stress. This preliminary research further illustrates not only that parents will complete questionnaires online but also that they like and will use Internet-mediated interventions, as reported in several studies. A particular line of inquiry of interest to us, therefore, has been how we can disseminate Internet-based interventions in a highly dynamic and interactive manner such that they reach an underserved population and retain or improve upon the core ingredients of existing evidence-based interventions and, as such, improve the chance for maximizing population impact through both reach and strength of effect.¹⁰ The purpose of this study was to evaluate the participation rates and factors associated with nonparticipation among mothers living in low-income households (i.e., meeting WIC guidelines) who were invited to join a parent education and support program delivered via the Internet with professional support.

Effects of Poverty

The Children's Defense Fund²⁰ estimates that 18.6% (one in six) of American children are born into poverty. In a review of mental health and developmental outcomes of very young children, poverty was identified as the best predictor of adverse outcomes.²¹ Children who live in poverty or experience severe economic losses have higher rates of depression, anxiety, and antisocial behaviors versus their peers.²² Furthermore, the likelihood of social and emotional problems increases with a child's exposure to additional family risk factors.²³ The parents of young children living in poverty are more likely to be young, single, and poorly educated than are parents with greater financial resources.²⁴ Mothers who are young and poor are less likely to receive adequate prenatal care and, consequently, are more likely to give birth to premature and low birth weight infants.²⁵⁻²⁷ Prematurity is associated with infant irritability²⁸ which, especially in the context of poverty, has been identified as a risk factor for problematic parent-child relationships²⁹ and poorer child outcomes (eg, behavior problems, cognitive delays, and school failure³⁰). Factors that have been found to mediate the negative effects of poverty on children's social and emotional development include low social support, increased parental stress, and harsh parenting styles.³¹

An epidemiological study of a representative population sample of 1,420 rural children dramatically demonstrates the effect of poverty on child mental health outcomes.³² During the study, the opening of a successful casino provided the opportunity to examine the impact of changed financial circumstances. Initially, poor children had higher levels of psychiatric symptoms than did never-poor children. Subsequent to the opening of the casino, levels of symptomatology among the ex-poor children fell to levels comparable to those of the never-poor children, while those of the persistently poor children remained high.

This project was designed to investigate participation issues. We began by removing one of the major obstacles to participation access, by providing mothers of infants the opportunity for free unlimited access to our website for six months using a laptop computer provided by the project. Elimination of this barrier permitted investigation of recruitment and participation; that is, the extent of interest in and willingness to participate in an Internet-based parent support research project. With the great prevalence of the Internet on our daily lives, the issue of participation in research with Internet-based intervention is important. Since we particularly wanted to study the appeal of an Internet-based program among low-income mothers, we made meeting WIC guidelines at screening the key criteria for inclusion.

Methods

The purposes of this paper are to (1) characterize participation rates and describe the participants in our “Baby-Net” parent support program, (2) report on the representativeness of participants, and (3) identify reasons for non-participation. Baby-Net is adapted from the Play and Learning Strategies program (PALS)³³ consisting of 11 sessions on maternal expectations and beliefs that promote development, reading infant signals, responding with warm and sensitive behaviors, maintaining vs redirecting infants’ focus of attention, watching for opportunities to introduce an object or social game, reading with baby, using rich verbal content including names of objects and actions in combination with physical demonstrations, and how to incorporate the use of the constellation of behaviors in everyday settings such as dressing and feeding. Specific components of the Baby-Net intervention included (a) the introduction of concepts with video examples and narrated text description; (b) “homework” using the PALS techniques with their baby; (c) the video recording via laptop their own interaction with their baby; (d) a telephone call with a professional to lead a reflective discussion based on co-viewing of their own self-made video; and finally, (e) a review of handouts summarizing the key skills and planning for skill practice during the following week. All participants were

provided with laptops and Internet access. The home-based "as your schedule permits" intervention was free of charge, convenient (ie, the participants are loaned a computer for four to six months), and designed to mitigate frequent participation barriers such as cost, transportation, child care, travel costs, and work schedules. All mothers (in both experimental and control conditions) received a laptop with cellular Internet connection for the six-month duration of the research project. The computer-control condition was designed to control for the potentially confounding effect of introducing computer and Internet technology into the homes of low-income families.

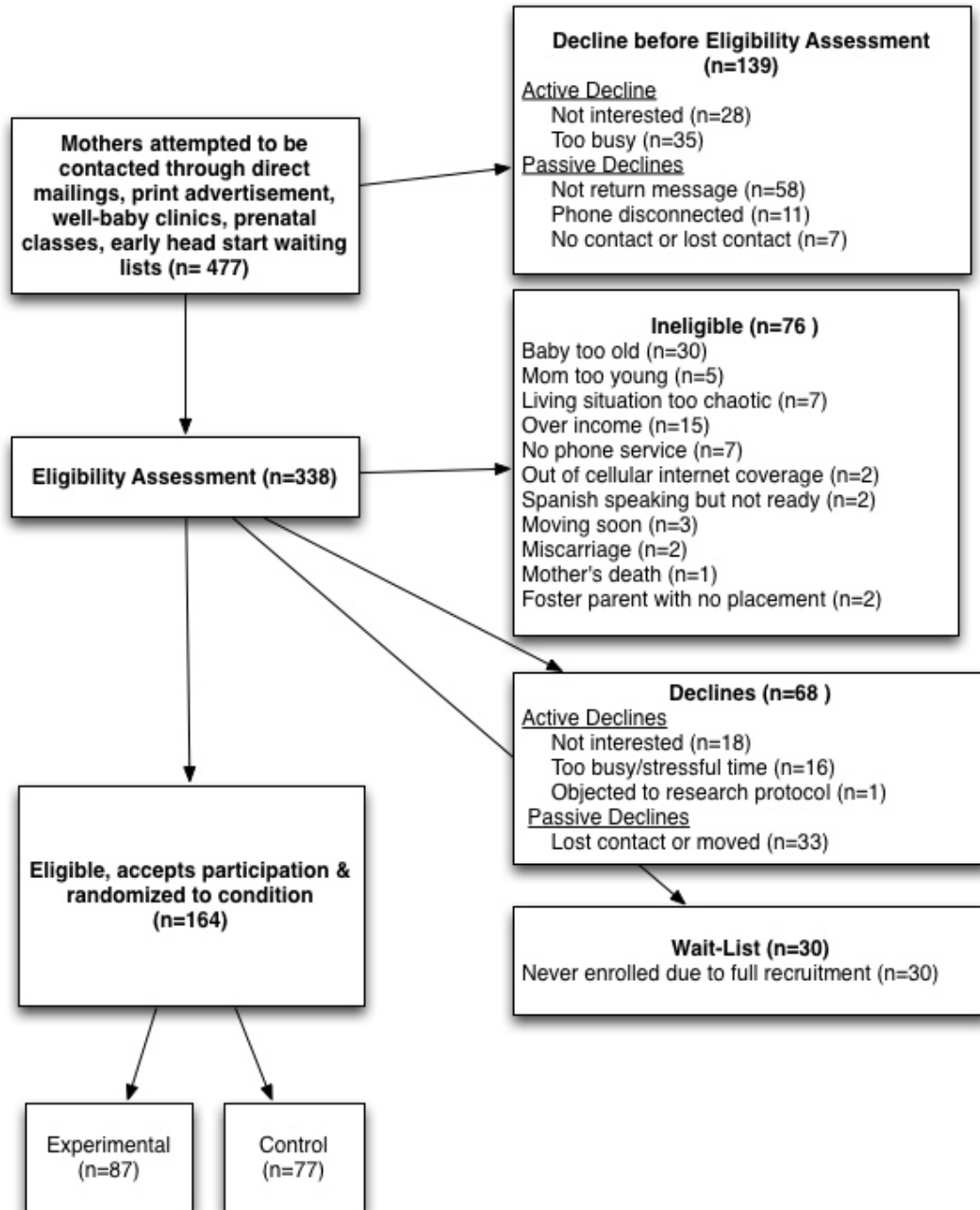
Recruitment Results

Participants were English- and Spanish-speaking low-income mothers of infants aged between 3 1/2 and 7 1/2 months-old at the start of intervention (birth to 3 1/2 months at screening) recruited from (a) Kansas City, Missouri metropolitan area and (b) rural and urban Oregon. We drew from a low-income population of mothers with infants. In a report by the National Center for Children in Poverty³⁴ on the family characteristics of low-income infants, 52% have at least one parent who works full-time, year-round, 20% do not have an employed parent, 26% live with parents who have less than a high school education, 36% live with parents who

have only a high school diploma, 38% live with parents who have some college or more. In the same report, they state that 70% of American Indian infants and toddlers, 64% of Latino infants and toddlers, 65% of black infants and toddlers and 31% of white infants and toddlers live in low-income families. For this study we used a variety of recruitment methods: presentations at well-baby clinics, community prenatal classes, and WIC breastfeeding classes; direct mailings to Department of Human Services' client list and Early Head Start waiting lists, print advertisement, and Internet posts on Craigslist. Using this diverse recruitment strategy we believe that we more accurately ascertain willingness to participate in an Internet-based research intervention program in a population that is greatly in need of effective services. The research team was able to collect names and phone numbers for 477 women likely to be eligible for participation. From the possible 477 mothers, 139 either actively declined or were not reachable, resulting in 338 mothers (71%) being assessed for eligibility (see Figure 1). To be included in the study, mothers had to: (a) have an infant younger than 7.5 months living with them, (b) meet Early Head Start low-income guidelines of less than 130% of poverty line (as defined by the Office of Management and Budget), (c) not have severe psychopathology or substance abuse problems, and (d) have relative residential stability (no plans for moving or not homeless). Seventy-six

mothers (22%) were ineligible due to the baby's age, mother's age, living situation too chaotic (ie, lack of residential stability), over income, lack of phone or cellular Internet coverage in their area, or other miscellaneous reasons. From the 262 mothers found eligible to participate, 68 (26%) declined, 30 (11%) were put on a wait-list but never enrolled due to full recruitment and 164 (63%) were enrolled in the program and completed baseline measures. Seventy-four percent of those eligible agreed to participate in the program.

Figure 1. Sequence of Steps in Recruitment for “Baby-Net” project



We conducted analyses to evaluate differences between those eligible and agreeing to participate (participants, $n = 164$) and eligible but declining to participate (decliners, $n = 68$) on several demographic variables: mother's age at first contact, baby's age at first contact in weeks and mother's marital status (see Table 1). Chi-square (for categorical marital status variable) and *T*-tests (for continuous age variables) found significant differences on baby's age at first contact but no significant differences on mother's age and marital status. Many decliners were first contacted during the prenatal period while participants' babies were older (and already born) at first contact. As one would expect, we found it more successful to recruit closer to the start of their participation, after their baby is born, than recruiting during the prenatal period. Mothers were an average age of 28 years and most were married (65.6%). Our sample of participants was diverse with a large number of Hispanic/Latina mothers. This low-income sample met 130% of poverty guidelines so it is not surprising that 70% reported having some difficulty paying bills each month. Approximately half had a high-school diploma or less, but 84% reported being moderately or very comfortable using a computer and half had a computer at home.

Table 1. Characteristics of participants and those eligible who declined participation

	Eligible & Participated (n = 164)	Eligible & Declined (n = 68)
Patient Characteristics		
Mean and Standard Deviation of Mother's age at first contact	28.1 (6.2) 22 missing	28.1 (6.3) 16 missing
Mean and Standard Deviation of Baby's age at first contact in weeks*	8.8 (13.5) 0 missing	-2.5 (15.7) 2 missing
Proportion of Mothers that are married	65.6% 7 not reported	74.5% 13 not reported

*p<.05

Table 2. Characteristics of participants (n = 164) and those eligible and randomized to experimental or control conditions

	Mother	Infant
Race		
African American	14.9 %	13.1%
White	56.5%	49.4%
Multiple Races	6.5%	18.5%
Ethnicity		
Hispanic/Latino	38.6%	42.7%
Spanish as primary language spoken at home	23.9%	
Home Demographics		
Married	65.6%	
Mean number of adults living at home	2.4 (1.1)	
Mean number of children living at home	2.4 (1.4)	
Some or great deal of difficulty paying bills each month	69.8%	
Mother's Education		
High school education or less	48.3%	
Mother's Computer Experience		
Moderately or very comfortable using a computer	84%	
Owns home computer	50.9%	

Discussion

Researchers have relatively recently started to address the issues of sample representativeness in reporting their findings. For our study focusing on the delivery of an Internet-based intervention, we wanted to illustrate that such a technology-focused program would appeal to a diverse low-income sample. Recruitment results from our study illustrate that we had broad acceptance for participating in this type of research with an Internet-based parenting intervention among potentially hard-to-reach and underserved populations. Our results show that three-quarters of low-income mothers of infants are interested in using an Internet-based program to help support their parenting and their child's development. We believe that we have such a participation rate due to the (a) acceptability of Internet-based interventions, (b) convenience of Internet-based interventions, (c) provision of computer equipment, reducing barriers, and, (d) need for services by low-income mothers. We realize that providing Internet-connected laptops was a key factor in our success. It is our assertion that the type of technologically advanced intervention proposed herein is feasible with a low-income (eg, Early Head Start) population due to growth and penetration of the Internet and relative technological familiarity of parents of infants. For policy makers, Internet-based intervention can greatly increase efficiency by reaching more families

since programs have large waitlists for traditional methods (support groups, parenting classes, home visits) while also providing opportunities to have a strong engagement with parents in distal/rural areas. With the recent economic downturn, the demand for such services is substantial because the number of infants and toddlers living in poverty is great. The fields of mental health and social services have the opportunity to expand their reach to meet a broader range of needs.

It should be noted however, that there are still segments of our society that have not been part of this technological trend, thus creating a "Digital Divide"^{6,35} of technology "have nots." As noted above, currently age, income, and educational attainment are the greatest contributors to the digital divide.⁶ An equalizer effect seems to be the results of smart phone ownership and cellular Internet access. By combining those that have broadband at home and/or own a smart phone, the digital divide between white and non-white dissipates. This penetration of mobile-based Internet technologies holds promise for the widespread dissemination of health-related information through the Internet. Given this trend, our Internet intervention is designed to complement existing services by providing professionally facilitated interventions and social support via an Internet connection accessible from parents' homes. This approach allowed a small number of staff to serve clients from a variety of programs,

and could become a generalizable model for use in managed and primary care settings or other situations implementing population-based care for an entire low-income target group. Our team is moving from laptop to mobile delivery to reach a broader population.

Evidence-based support services can be provided in an appealing, attractive, and low-cost manner via an Internet website. Participants can access educational and support resources from the privacy of their own homes, as their schedule permits, and provide ongoing, rather than time-limited, support. Our results show that interactive Internet interventions can appeal to a wide range of parents. It remains for future research to evaluate if the Internet modality can maintain participation in an ongoing basis and help diverse low-income mothers of infants initiate and maintain meaningful behavior changes.

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