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A qualitative study exploring how Brazilian immigrant mothers living in the United States obtain information about physical activity and screen-viewing for their preschool-aged children

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Running head: Brazilian mothers information sources physical activity

A qualitative study exploring how Brazilian immigrant mothers living in the United States obtain information about physical activity and screen-viewing for their preschool-aged children

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Data Sharing: Data and all other materials for this study are kept at the Department of Exercise and Health Sciences, University of Massachusetts Boston. The datasets generated during and/or analyzed during the current study are not publicly available due the terms of consent to which participants agreed to, but are available from the corresponding author on reasonable request.

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ABSTRACT

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Objective: Parents access to accurate information about physical activity (PA) and screen-

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viewing (SV) behaviors that they easily understand is central to their ability to implement

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healthy practices and routines related to these behaviors for their preschool-aged children. To our

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knowledge, no existing research has examined how Brazilian-born immigrant mothers' living in

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the United States (U.S.) access information about PA and SV behaviors for their preschool-aged

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children. The present study was designed to address this gap in the available literature.

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Methods: Focus group discussions (FGDs) with 37 Brazilian immigrant mothers of preschool-

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age children living in the U.S were conducted. Audio-recorded FGDs were transcribed verbatim

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in Portuguese and analyzed using thematic analyses.

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Results: Analyses revealed that the majority of mothers participating in the study did not

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initially actively seek information about PA and SV for their preschool-age children. However,

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nearly all mothers spoke of receiving unsolicited information from their child's pediatrician and

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WIC staff during routine health care visits that increased their knowledge about the importance

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of making sure their children were physically active and not participating in excessive SV. This

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increased awareness led mothers to actively seek information about PA and SV behaviors via the

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Internet and through interpersonal communication with fellow Brazilian friends and family.

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Conclusions: Health promotion interventions designed for low-income, Brazilian immigrant

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parents should consider the multiple information sources used by parents to obtain unsolicited

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and solicited information about PA and SV for their preschool-aged children. Culturally and

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linguistically suitable eHealth interventions may be viable ways to provide accurate information

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to Brazilian immigrant families of preschool-aged children to promote healthful PA and SV

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behaviors and these eHealth interventions should consider involving pediatricians possibly

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through including endorsement (e.g., prescription for PA and maximum SV time) given the value mothers placed on their advice or other valued health care professionals.

Keywords: Brazilian; immigrant; mothers; information; physical activity; screen-viewing

Strengths and limitations of this study:

- Brazilians are a rapidly increasing Latino immigrant population sub-group in the U.S., yet little research has focused on health-related behaviors that may affect Brazilian immigrant children's health. To our knowledge, no existing research has examined how Brazilian-born immigrant mothers' living in the U.S. access information about PA and SV behaviors for their young children. This information is crucial for the design of culturally appropriate early childhood obesity prevention interventions that are tailored to this ethnic group.
- Findings revealed that the Brazilian immigrant mothers participating in this study did not initially actively seek out information about PA and SV for their preschool-age children, but instead receive unsolicited information from multiple sources. Nearly all mothers spoke of receiving unsolicited information from their child's pediatrician and WIC staff during routine health care visits that increased their knowledge about the importance of making sure their children were physically active and not participating in excessive SV. This increased awareness led mothers to actively seek information about PA and SV behaviors via the Internet and through interpersonal communication with fellow Brazilian friends and family. Mothers viewed the Internet as being a convenient way to easily access a broad range of information about these behaviors in their native language, Portuguese.

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- 101 • Despite widespread use of the Internet to obtain information in their native language,
102 routine health care visits with pediatricians emerged as important source of unsolicited
103 information about PA and SC. Mothers valued advice given by their child’s pediatricians,
104 and also viewed WIC staff as providing important information about SV
- 105 • Culturally and linguistically suitable eHealth interventions may be viable ways to provide
106 accurate information about PA and SV to Brazilian immigrant families of preschool-aged
107 children. Study findings suggest the importance of involving health care professionals
108 (pediatricians and WIC staff) in interventions. Health care providers could endorse
109 healthful behaviors (e.g., prescription of PA) as well as other information delivered by
110 eHealth interventions. This would likely increase both legitimacy and acceptance of such
111 interventions aimed at increasing awareness and educating Brazilian immigrant parents
112 about PA and SV behaviors for their preschool-aged children.
- 113 • Study results should be considered in light of study limitations. Findings are based on a
114 nonrandom and purposeful sample of low-income, Brazilian-born immigrant mothers in
115 two MA communities, which limits generalizability. There also is possibility of selection
116 bias as mothers with a heightened interest in or awareness of the importance of child
117 health behaviors may have been more likely to participate in the study. Thus, further
118 research is needed to establish study generalizability and to explore if they are
119 generalizable to a broader group of Brazilian immigrants.

120 INTRODUCTION

121 One in 5 children in the United States (U.S.) is a member of an immigrant family, which
122 is defined as a family with at least one parent who is an immigrant [1]. A large proportion of
123 these children are part of immigrant families from Latin America (55% of all first- and second-
124 generation immigrants in the U.S. were of Hispanic origin in 2014), making Latinos the largest
125 and fastest growing immigrant group in the U.S. [1].

126 Brazilians are a rapidly increasing Latino immigrant population sub-group in the U.S.
127 yet, little research has focused on health-related behaviors that may affect Brazilian immigrant
128 children's health [2,3]. Brazilians began immigrating to the U.S. in increasing numbers in the
129 1980s due to deteriorating economic conditions in Brazil [2]. Although Brazilians share many
130 cultural characteristics of other Latin American population groups, Brazilians represent many
131 different ethnic backgrounds, including Africans, Europeans, and Native-Brazilians [2,3].
132 Portuguese is the official language of Brazil, and an important cultural difference between
133 Brazilians and other Latin American population groups that primarily speak Spanish [4].
134 According to the 2006–2010 American Community Survey of the approximately 400,000
135 Brazilian immigrants living in the U.S., nearly half live in the northeastern states, mostly in
136 Massachusetts (MA; about 19%), New York, and New Jersey [2,3]. A recent study conducted in
137 the Greater Boston area of MA, found that 48.2% of Brazilian immigrant children (aged 3–12
138 years) were overweight or have obesity [5].

139 Promoting physical activity (PA) is a key component of preventing and reducing
140 childhood obesity [6-8]. Nonetheless, rates of PA among young children have declined over the
141 past decades, and most children are not accruing sufficient daily PA [6-8]. Excessive sedentary
142 behavior (e.g., screen-time) is even a greater problem among racial/ethnic minority children in

Brazilian mothers information sources physical activity

the U.S., with greater prevalence of sedentary behaviors among Hispanic children than non-Hispanic White children [7].

In the U.S., the National Association for Sport and Physical Education (NASPE) recommends that preschoolers engage in at least 60 minutes of structured PA and 60 minutes of unstructured or spontaneous active play daily for a combined minimum of 120 minutes of PA daily [8]. Similarly, the American Academy of Pediatrics recommends that clinicians encourage parents to increase PA and decrease time spent in sedentary activities (e.g., screen-time, time spent indoors, etc.) in a manner compatible with the developmental level of a child [9]. In addition, due to the increasing rates of sedentary behaviors among preschool-aged children [9-11], several countries including the U.S. have developed screen-viewing (SV) guidelines. For example, the American Academy of Pediatrics recommends that SV time not exceed two hours per day for children over two years of age [9].

Mounting evidence points to the central role parents play in helping their children develop early healthy PA and SV behaviors [12-25]. One way parents influence their children's PA and SV behaviors is through their parenting practices [14-16, 18]. Parents' access to accurate information about PA and SV behaviors that they easily understand is essential to their ability to promote practices conducive of healthy PA and SV behaviors of their children [25-27]. Access to comprehensible information is especially important for minority low-income parents, who may face additional barriers (e.g., limited or lack of access to quality health care, language barriers, etc.) to obtaining health-related information that they understand [28].

Despite the importance of parents' accessing accurate information about PA and SV behaviors for their young children, to date, there is little available research examining how and from whom low-income, immigrant parents seek and obtain information about these behaviors

Brazilian mothers information sources physical activity

for their young children [29]. While current research indicates that parents obtain health-related information from a range of sources including books, magazines, the Internet, family, friends, and health professionals [30-32], to our knowledge, no existing research has examined how Brazilian-born immigrant mothers' living in the U.S. access information about PA and SV behaviors for their young children. This information is crucial for the design of culturally appropriate early childhood obesity prevention interventions that are tailored to this ethnic group. Therefore, the aim of this exploratory study was to investigate how Brazilian-born immigrant mothers living in the U.S. obtain information about PA and SV behaviors for their preschool-aged children.

METHODS

Design, Setting and Sample

This study was conducted in two cities in MA: Somerville and Everett. The present qualitative study was part of a larger ongoing mixed-methods research with Brazilian families living in the Greater Boston, MA, examining parenting styles and parenting practices (e.g., promoting healthy eating, PA and sleep; limiting sedentary time and excessive screen-viewing) related to the risk of childhood obesity [33-35].

Focus group discussions (FGDs) were used to gain an in-depth understanding of how Brazilian-born immigrant mothers living in the U.S. obtain information about PA and SV behaviors for their preschool-aged children. FGDs are a valuable technique for working in diverse cultural settings as they yield rich information [36] as the synergistic effects of the group settings elicit ideas and discussion that may not arise in individual interviews [37]. Mothers were recruited from two predominantly Brazilian churches in MA. This study received ethical approval from the University of Massachusetts–Boston Ethics Board (IRB # 2013060).

Data Collection

A convenience sample of 37 Brazilian immigrant mothers living in the Greater Boston area were recruited through posted flyers and at church events between March–August 2017. Interested participants called the phone number listed on the flyer or spoke to study staff at church events. Study staff assessed eligibility, and women were invited to participate if they had at least one child aged 2–5 years, were of Brazilian ethnicity, born in Brazil, and had been living in the U.S. for at least 12 months. In addition, participants were recruited using a snowball technique [38], with women who had enrolled in the study asking their Brazilian friends with preschool-aged children if they would be interested in participating in the study [38].

Seven FGDs (range of 4 to 7 participants per FGD) were held at two local churches between April and August 2017. Before each FGD, the moderator explained in Portuguese the study’s purpose, FGD procedures, study confidentiality, and obtained written informed consent from all participants. A native Brazilian-Portuguese speaker (ACL) trained in qualitative research methods moderated all FGDs in Portuguese using a semi-structured discussion guide that explored participants’: 1) information-seeking about PA and SV; and 2) sources of information about PA and SV for their young children. The guide was piloted in a FGD with a small group of Brazilian immigrant mothers (n = 4) and then refined prior to use.

Before each FGD started, the moderator asked participants to think about their preschool-aged children when participating in the discussion. A trained, bilingual (Portuguese and English) research assistant (GDA) took notes during all FGDs, which were audio-recorded and lasted between 60-80 minutes. The moderator and research assistant met for about 15 minutes at the end of each FGD to review new and recurring themes, which were entered into a grid that was used to closely follow emerging themes and to determine when data saturation was reached.

Brazilian mothers information sources physical activity

Lastly, at the end of each FGD, participants completed a brief, self-administered questionnaire in Portuguese that assessed education, marital status, country of origin, length of time living in the U.S., and acculturation, which was assessed via the Short Acculturation Scale for Hispanics (SASH), a 12-item measure scale validated for use in Latinos, including Mexican Americans, Cuban Americans, Puerto Ricans, Dominicans, and Central and South Americans. The SASH assesses language use, media use, and ethnic social relations [39,40]. Each item was measured on a scale of 1–5 (1=least acculturated, 5=fully acculturated), and an acculturation score was computed by averaging across the 12 items.

Analysis

A professional, native Brazilian speaker transcribed all audio recordings verbatim. The Portuguese transcripts were analyzed using thematic analysis, an iterative process of coding the data in phases to create meaningful patterns [41–43] by two experienced qualitative researchers who are native Portuguese speakers (ACL, CAMA). Each researcher read several transcripts numerous times to become familiar with the content and generate initial codes [42,43]. The researchers then manually coded transcripts independently, but met regularly to discuss coding and disagreements in coding were discussed and resolved [43]. The coded text describing similar ideas were grouped and sorted to identify emergent themes and subthemes. Finally, salient text passages were extracted, and translated into English to be used as illustrative quotes for the emergent themes. Descriptive statistics and frequencies were calculated for data collected in the socio-demographic survey using Microsoft Excel 2008.

RESULTS

Seven FGDs (average of 5 participants per group; range = 4–7) were conducted before saturation was reached, with no new themes or subthemes emerging during the final group.

Brazilian mothers information sources physical activity

Mothers' (n = 37) ages ranged from 26 to 41 (M = 35.3, SD = 2.8) years. Approximately 92% (n = 34) of participants were married with two children on average. Most (72%; n = 21) had graduated from high school, and were self-employed and owned their own housecleaning business (92%; n = 34). Approximately half (51%; n = 19) reported a family income of \$40,000 or less, while the remainder reported an annual income between 40,000 - \$60,000. In addition, most spoke Portuguese at home (92%, n = 34), watched television programs in Portuguese (95%), and reported that the majority of their friends were Brazilians (87%). Participants were originally from three main regions of Brazil (e.g., the southeast (e.g., Espirito Santo, Sao Paulo, and Minas Gerais), the south (e.g., Santa Catarina), the mid-west (e.g., Goias and Mato Grosso), with the majority (64.7%; n = 22) being from the state of Minas Gerais, Southeast region. Mothers had lived in the U. S. for an average of 6.7 (SD= 2.84) years, and their mean acculturation score was 1.43 (SD=0.77), indicating that they identified more closely with Brazilian culture than with U.S. culture.

Emergent themes are presented below with representative quotes.

Theme 1: Mothers report that they do not initially actively seek information about PA and SV for their preschool-aged children

Most mothers reported that initially they did not actively seek information about PA and SV for their preschool-age children. Some mothers said they did not think about finding information about these behaviors. However, other mothers explained that they did not seek out this information as they felt it was not needed because either they were knowledgeable about PA and SV, or because their children were active. In fact, several mothers mentioned that young children are “naturally” physically active and therefore, they did not think it was necessary to seek advice and/or information about PA for their young children.

Brazilian mothers information sources physical activity

“... I don’t think that there is a need to worry about young children being physically active. They [young children] are always moving and busy ...” Mother #3, 2 children (8- and 3-years old)

“in my case, I have an older one [9 years old], so I never think of asking or looking for information about PA for the little one...” Mother #16, 2 children (9- and 4-years old)

“in reality, we all know that it’s not good for the kids to be on the iPod all the time...” Mother #9, 3 children (10-, 7- and 3-years old)

Theme 2: Mothers receive unsolicited information about PA and SV from multiple sources

Analyses revealed that mothers receive unsolicited information about PA and SV behaviors from five main sources: 1) interpersonal communication with their social network of Brazilian friends and family members; 2) health care professionals (pediatricians and WIC staff); 3) Brazilian media; 4) public health education campaigns; and 5) health-related community-based programs and research. Many mothers spoke of these information sources prompting them to seek additional information about PA and SV.

Interpersonal communication with social network of friends and family members

Several mothers mentioned that their conversations with fellow Brazilian immigrant mothers and family members made them to take notice of their young child’s PA and SV behaviors and to seek out PA-related information, including information about existing PA programs, classes, etc.

“[child’s name] is my first child and I did not think much about his physical activity until a friend at church mentioned that she had enrolled her 3-year old son in a movement class at the YMCA. That got me curious and thinking about my son and led me to seek further information...” Mother #17, 1 child (3-years old)

Brazilian mothers information sources physical activity

281 Mothers spoke of valuing information from their friends and family due to their similar
282 cultural backgrounds, experiences, and shared beliefs and values. In addition, mothers valued the
283 ease of communication due to speaking in their native language. Moreover, several mothers
284 mentioned that their social networks provided a broad range of information about PA and SV,
285 including information about how much SV is too much for young children, organized sports and
286 classes, and different types of community-based physical activities for young children.

287 “We [mothers] always talk among ourselves about our children’s health and health
288 habits... we [mothers] all struggle with the kids using the iPads too much and playing
289 games, watching videos, so we kind of inform each other of what we know...” Mother
290 #22, 2 children (6- and 4-years old)

291 “My son is 5 years old and all he wants to do is to watch videos and play games on his
292 tablet... So, I start talking with my friends who also have children his age, asking to see
293 if they had some suggestions about managing their children’s use of electronics because I
294 have to say that in my house it’s a struggle to get him [son] to want to do something else”
295 Mother #31, 2 children (6- and 4-years old)

296 “a friend of mine told me her [4-years old] was doing an all ball sports class (soccer,
297 basket ball) at the local YMCA and I signed my son up. He loves it! He’s always asking
298 me, “mom, do I have sports class today?” Mother #12, 1 child (4-years old)

299 Mothers felt that being able to discuss information about PA and SV in their native
300 language with other Brazilian mothers was particularly important. Several mothers reported
301 valuing the opinion of their friends who were mothers like them, and felt a sense of social
302 support from their interactions with friends.

Brazilian mothers information sources physical activity

303 “I don’t know, it’s just easier to talk in one’s own language. We understand each other
304 and know exactly what everything means ... even if you know some English, it’s not the
305 same...” Mother #34, 3 children (7- and 3-years old)

306 “It’s helpful to hear from other mothers like us, who are also trying to manage a work
307 schedule, raising a family, and trying to make sure that the children are healthy...I am
308 very thankful that I have friends...like, from Brazil, who understand the way we raise
309 children. You know, it’s nice when you are from the same culture... It’s good to know
310 that you are not alone...” Mother #27, 2 children (7- and 5-years old)

311 Additionally, mothers reported that the information and advice from friends and family
312 influenced their parenting practices including enrolling children in sports, and limiting SV.

313 “A friend of mine who has three children, one the same age as my son, mentioned that
314 she had her two sons (6- and 3-years old) enrolled in karate lessons and that her sons
315 loved it! She [friend] said it was really good for her sons, even the little one. So, I
316 decided to enroll my son... and he loves it!” Mother #6, 1 child (4-years old)

317 “...in my house now I have a rule – no iPad at the table during meals! I was talking with
318 my friend and she said that she set rules for her children because otherwise the kids are
319 on their iPad all day long. I think that’s a great idea, and I now do the same.” Mother #
320 13, 2 children (8- and 4-years old)

321 *Health care professionals (pediatricians and WIC staff)*

322 More than half of the mothers reported that their child’s pediatrician was an important
323 source of unsolicited information about PA and SV behaviors. Mothers said that they did not
324 initially seek out information about these behaviors from their pediatrician, but, they reported

Brazilian mothers information sources physical activity

that in most instances that the pediatrician inquired about their child’s PA and SV habits, and shared information on current recommendations during well-child’s appointments.

“When my son was about 2-3 years old, I recall his pediatrician asking some questions about his screen-time habits... like did he have a TV in his [son] bedroom? How much TV he watched?” Mother #28, 1 child (4-years old)

“I remember one time I took my daughter to a doctor’s appointment and she had several scratches and bruises in her legs and the doctor was looking... I felt nervous and started explaining that she’s always running around non-stop and she [doctor] said that’s good sign that she’s active and then she said it was important for children to be physically active and at the end of the visit gave me some printed information...” Mother #36, 3 children (7-, 5 and 3-years old)

For many mothers, the information from their children’s doctor served as a catalyst for them to seek out additional information from their social networks of friends and family.

“Until her [daughter] doctor mentioned about too much TV and use of electronics being a problem and interfering with sleep I did not think to look for information, but after he [doctor] mentions it I started talking to my friends who also have children and that’s how I started learning...” Mother #5, 1 child (5-years old)

“... in a doctor’s visit my son’s pediatrician asked me about how much TV and other electronics he typically watched ... that got me thinking that perhaps my son was watching too much TV and videos. So, I started thinking about it more and talking with others [friends] and looking for information ... he was indeed spending a lot of time watching videos and playing games...” Mother #19, 2 children (7- and 4-years old)

Brazilian mothers information sources physical activity

Nearly all mothers reported valuing the information they received from their pediatricians. Moreover, some mothers mentioned using repeated well-child visits as opportunities to clarify or validate PA and SV information obtained from other sources (e.g., friend and the Internet).

“In my case, I like to ask her doctor because you hear and read about all sorts of health information everywhere. Sometimes it’s hard to know what’s [information] good and what’s not, right? So, when I take her to her medical consultation I ask her doctor because he is the expert...I feel confident on what he says. He’s really good” Mother #7, 1 child (4-years old)

In addition, some mothers also mentioned the WIC staff were a source of information about PA and SV recommendations for their preschool-age children. Like with their child’s pediatrician, mothers mentioned that they did not seek out this information rather this information, especially information about TV viewing was given during their routine visits.

“Every time I take my daughter for her WIC visit, the nurse [WIC staff] asks about her foods and what she eats... she also always ask questions about the TV. It’s not really about physical activity, it’s more how much TV she watches ... she talks a lot that kids should not watch a lot of TV and have TV in the bedroom. Every time I go there [WIC program], she asks and talks about that...” Mother #9, 2 children (7- and 4-years old)

“Every time I take my daughter to her WIC appointment the WIC nurse [WIC staff] asks about her eating, TV watching and if she spends too many hours watching TV or videos ...” Mother #33, 3 children (11-, 8 and 3-years old)

Brazilian media

Brazilian mothers information sources physical activity

369 About half of the mothers mentioned learning about PA and SV behaviors from media
370 outlets including Brazilian TV channels that aired Brazil programs. Several mothers viewed
371 Brazilian media outlets as providing information that was easy to grasp due to its cultural and
372 linguistic relevance.

373 “I watched a program on Globo [Brazilian TV channel] about childhood obesity and it
374 had lots of good information about children’s unhealthy habits... we live here in America
375 and sometimes we think that in Brazil things are the way when we [parents] were kids,
376 but it’s all the same ... kids not being active, a lot of use of electronics ...” Mother #11, 2
377 children (6- and 4-years old)

378 “Sometimes on Bem Estar [“Well Being”- Brazilian TV show] they have interviews and
379 talk about children’s health. So, I hear the information and then I talk with friends, other
380 moms, you know, asking if they heard, if they know... we [moms] talk about all sorts of
381 things regarding our children amongst ourselves... and we are always learning from each
382 other...” Mother #34, 2 children (9- and 5-years old)

383 *Public health campaigns*

384 A few mothers mentioned obtaining information about PA and SV from public health
385 campaigns on TV, radio, billboards, etc. and that these campaigns were informative, and
386 increased their awareness and knowledge about the importance of these behaviors for young
387 children, which in turn led to their seeking additional information on these topics.

388 “You hear about children’s health everywhere... they have a lot of information on
389 programs... you even see it in billboards on the road. Here [U.S.] there is a big concern
390 about childhood obesity. Everywhere you turn you find information about it...” Mother
391 #35, 3 children (12-, 9- and 4-years old)

Brazilian mothers information sources physical activity

392 *Community-based programs and health-related research*

393 A couple of mothers mentioned that health-related research and community-based
394 programs offered by faith-based organizations and at other Brazilian community events as being
395 sporadic sources of information for families.

396 "...in community events sometimes we [moms] hear about childhood obesity –nutrition,
397 physical activity, and too much use of electronics by kids...a lot of the community health
398 fairs has information on children's health, and a lot about child obesity ..." Mother #22,
399 2 children (6- and 4-years old)

400 "A couple of years ago they had a research study at our Church... I think it was called,
401 mmmm, Viver Bem (Live Well). They [research staff] came several times to talk to the
402 mothers' groups. They talked about obesity, and families with children. They ask a lot
403 questions too and then if you wanted you could participate [research]... it was a lot
404 related to preventing obesity in children and they talked about physical activity and
405 electronics too..." Mother #4, 4 children (9, 7, 5- and 3-years old)

406 *Theme 3: Mothers use the Internet to seek out information about PA and SV in their native*
407 *language*

408 The Internet emerged as the main information source used by mothers use to seek out
409 information about PA and SV. Almost three-quarters of the mothers reported accessing the
410 Internet using multiple platforms (computers, smartphones, tablets), with smartphones being
411 used most often to find information about these behaviors due to ease, convenience, and it
412 allowed them to find a range of available information in their native language.

413 "Whenever I have questions, I ask Dr. Google (laughs)! The best thing is Dr. Google
414 speaks my language [Portuguese] (more laughs). My husband sometimes asks me how do

Brazilian mothers information sources physical activity

I know something is right or not? I say, I don't really know, so let's ask Dr. Google!

(laughs)" Mother # 13, 2 children (8- and 4-years old)

Nonetheless, several mothers also mentioned feeling overwhelmed with the amount of information available, and not always being able to discern between "good" and "bad" information.

"You start looking for information and there's just so much out there that it's easy to get lost...it's hard to know what's good information and what's not...I like that one can find out about anything in the Internet, but when it's health I think one needs to be more careful..." Mother # 28, 2 children (7- and 3-years old)

As mentioned previously (see theme 2 – health care professionals), several mothers reported validating information that they obtained from the Internet with their children's pediatrician.

"Whenever the doctor mentions something about screen time or physical activity during a health visit I take the opportunity to clarify any questions I might have. You know, there's just so much information out there. I like to hear what is the doctor's [pediatrician] opinion, so I ask..." Mother #7, 1 child (4-years old)

DISCUSSION

Parents play a unique role in promoting their children's early development of healthy PA and SV behaviors [13-24], and it is important to consider how parents access information related to these behaviors. Therefore, the current study explored where Brazilian immigrant mothers living in the U.S. obtain information about PA and SV for their preschool-age children. This information is needed due the dearth of research on how low-income, immigrant mothers obtain information about PA and SV behaviors for their young children, despite the importance of

Brazilian mothers information sources physical activity

parents' access to sound information about these early health behaviors [29,44,45] as this information is crucial for the design of culturally appropriate early childhood interventions to promote healthy PA and SV behaviors and prevent obesity [46,47]

Our findings revealed that the Brazilian immigrant mothers participating in this study did not initially actively seek out information about PA and SV for their preschool-age children, but instead received unsolicited information from multiple sources. Receiving unsolicited information prompted mothers in this study to seek out additional information about these behaviors.

Routine encounters with pediatricians and WIC nutritionists were identified as important sources of unsolicited information about PA and SV behaviors for mothers in the current study. Similar to previous research, our findings suggest that routine well-child visits increased mothers' awareness of the importance of early PA and SV behaviors for their children's health and well being and this realization motivated mothers to seek out additional information from other sources such as the Internet, and friends and family [50-52]. Study findings also showed that mothers value information received from their child's pediatrician and WIC staff, and many take advantage of routine health encounters with their child's pediatrician to corroborate information obtained from other sources such as the Internet. This finding is in agreement with evidence documenting that health care professionals play a central role in guiding consumers to quality online health information [53,54].

Consistent with previous research with other ethnic minority groups including Latinos [29, 55], we found that interpersonal communication between social networks comprised of ethnically similar friends and family members was a key source for mothers' obtaining unsolicited and solicited information about PA and SV for their preschool-age children [29].

Brazilian mothers information sources physical activity

461 Prior research shows that shared language, cultural beliefs and values are important factors
462 influencing reliance on interpersonal communication with ethnically similar social networks of
463 friends and family [55,56]. Mothers reported that speaking with other Brazilian mothers in their
464 native language was particularly important and valued source of information and advice about
465 PA and SV.

466 Consistent with previous research with other ethnic immigrant populations [57-60], the
467 Internet emerged as an important source for mothers seeking information about PA and SV
468 behaviors. Mothers participating in this study spoke of accessing the Internet frequently using
469 multiple platforms (computer, tablets, smartphones) to obtain information about PA and SV due
470 to convenience and easy access to a broad range of information in their native language
471 (Portuguese) [46,61,62]. Nonetheless, study findings also revealed that several mothers felt
472 overwhelmed with the abundance of available information, and were not always able to discern
473 the credibility of this information. In combination, these findings suggest the potential for further
474 exploration of eHealth interventions (email, text, etc.) to disseminate PA and SV information to
475 Brazilian immigrant families with young children. Furthermore, although more research is
476 needed, study findings suggest that increasing the availability of reliable and
477 valid eHealth information in Portuguese language could have a positive influence on increasing
478 awareness and promoting healthy PA and SV behaviors among low-income, minority Brazilian
479 children of immigrant families living in the U.S.

480 Television programs (e.g., “Bem Estar”) in the participants’ native language emerged as a
481 source of information about weight status, PA and SV behaviors. Several mothers reported
482 appreciating that these programs offered culturally relevant information that aligned with their
483 beliefs and values. This finding is supported by prior research with other ethnic minority groups,

Brazilian mothers information sources physical activity

which shows that television programs in native language are common sources of health information due to familiarity with language and shared cultural values [63,64].

Some mothers reported U.S. public health media campaigns were provided information about PA and SV behaviors. Nevertheless, for some mothers, language barriers [65] appeared to influence their preference for obtaining information from other sources such as the Internet and Brazilian TV shows. This finding suggests that increased availability of campaigns using the Portuguese (Brazilian) language and in partnership with Brazilian ethnic media could be a viable source of credible source of health information for Brazilian immigrant families.

A few mothers also spoke of community health-related programs and research as a source of information about PA and SV behaviors. This finding is important in emphasizing the significance that community-based health research and programs can play in raising awareness and educating minority community groups about relevant health-related topics.

Finally, study findings suggest the importance of involving health care professionals (pediatricians and WIC staff) in interventions. Health care providers could endorse behaviors (e.g., prescription of PA) as well as information delivered by eHealth interventions which based on our findings would likely increase both legitimacy and acceptance of such interventions aimed at increasing awareness and educating Brazilian immigrant parents about PA and SV behaviors for their preschool-aged children [66,67].

LIMITATIONS AND STRENGTHS

Study results should be considered in light of study limitations. Findings are based on a nonrandom and purposeful sample of low-income, Brazilian-born immigrant mothers in two MA communities, which limits generalizability. There also is possibility of selection bias as mothers with a heightened interest in or awareness of the importance of child health behaviors may have

Brazilian mothers information sources physical activity

been more likely to participate in the study. Thus, further research is needed to establish study generalizability and to explore if they are generalizable to a broader group of Brazilian immigrants. Future research can address these limitations by exploring information-seeking behaviors and sources of information used by low-income, minority mothers from other communities across the U. S., selecting a larger sample size, and employing multiple data collection methods, including both qualitative and quantitative methods.

CONCLUSIONS

Evidence suggests that parents need to be aware of the importance of early healthy behaviors and have access to accurate information that they understand in order to implement early healthy practices and routines for their young children [67-72]. Study results indicate that despite widespread use of the Internet to obtain information in their native language, routine health care visits with pediatricians emerged as important source of unsolicited information about PA and SV, and mothers favorably valued advice given by their child’s pediatricians. WIC staff was seen as providing important information about SV. Culturally and linguistically suitable eHealth interventions may be viable ways to provide accurate information about PA and SV to Brazilian immigrant families with preschool-aged children [65-69]. Finally, more research is needed to ensure Brazilian immigrant mothers’ health literacy, numeracy, and ability to navigate the online environment.

ABBREVIATIONS

AAP: American Academy of Pediatrics; FGD: Focus Group Discussion; MA: Massachusetts; PA: physical activity; SASH: Short Acculturation Scale for Hispanics; SV: screen-viewing; U.S.: United States.

Brazilian mothers information sources physical activity

REFERENCES

1. Hernandez, D. J., Denton, N. A., & Macartney, S. E. (2008). Children in immigrant families: Looking to America's future. *Social Policy Report*, 22(3). Retrieved from <http://www.childtrends.org/?indicators=immigrant-children>
2. Lima, A., & Siqueira, C. E. (2007). Brazilians in the U.S. and Massachusetts: A demographic and economic profile. *Gastón Institute Publications*, Paper 50. Retrieved from: http://scholarworks.umb.edu/gaston_pubs/50/
3. Jouët-Pastré, Clémence, and Leticia J. Braga. *Becoming Brazuca: Brazilian Immigration to the United States*. Cambridge, Mass.: David Rockefeller Center for Latin American Studies, Harvard University Press, 2008.
4. Goza, F. (1994) Brazilian immigration to North America. *International Migration Review*, 28(1), 136-152.
5. Tovar A, Hennessy E, Must A, et al. Feeding styles and evening family meals among recent immigrants. *Int J Behav Nutr Phys Act*. 2013;10:84. doi:10.1186/1479-5868-10-84.
6. O'Dwyer, M. V., Fairclough, S. J., Knowles, Z., & Stratton, G. (2012). Effect of a family focused active play intervention on sedentary time and physical activity in preschool children. *International Journal of Behavioral Nutrition and Physical Activity*, 9(1), 1-13.
7. Chuang R. J., Sharman S., Skala, K., & Evans, A. (2013). Ethnic differences in the home environment and physical activity behaviors among low-income, minority preschoolers in Texas. *American Journal of Health Promotion*, 27(4), 270-278. doi:10.4278/ajhp.110427-QUAN-171
8. National Association for Sport and Physical Education (NASPE). (2009). *Active start: A statement of physical activity guidelines for children from birth to age 5* (2nd ed.). Sewickley, PA: American Alliance for Health, Physical Education, Recreation, and Dance.
9. American Academy of Pediatrics (AAP). (2006). Active healthy living: Prevention of childhood obesity through increased physical activity. *Pediatrics*, 117, 1834-1842.
10. Commonwealth of Australia, Department of Health and Ageing. (2010). *Move and play every day: National physical activity recommendations for children 0 to 5 years*. Retrieved from [http://www.health.gov.au/internet/main/publishing.nsf/content/9D831D9E6713F92ACA257BF0001F5218/\\$File/0-5yrACTIVE_Brochure_FA%20SCREEN.pdf](http://www.health.gov.au/internet/main/publishing.nsf/content/9D831D9E6713F92ACA257BF0001F5218/$File/0-5yrACTIVE_Brochure_FA%20SCREEN.pdf)
11. Tremblay, M. S., Leblanc, A. G., Carson, V., Choquette, L., Connor Gorber, S., Dillman, C., ... Timmons, B. W. (2012). Canadian physical activity guidelines for the early years (aged 0 to 4 years). *Applied Physiology, Nutrition, and Metabolism*, 37(2), 370-391.
12. Lindsay, A. C., Sussner, K. M., Kim, J., & Gortmaker, S. (2006). The role of parents in preventing childhood obesity. *Future of Children*, 16(1), 169-186
13. O'Connor, T. M., Cerin, E., Lee, R. E., Parker, N., Chen, T. A., Hughes, S. O., ... Baranowski, T. (2014). Environmental and cultural correlates of physical activity parenting practices among Latino parents with preschool-aged children: Niños activos. *BMC Public Health*, 14, 707. doi:10.1186/1471-2458-14-707
14. Byrd-Bredbenner C, Martin-Biggers J, Povis GA, Worobey J, Hongu N, Quick V. Promoting healthy home environments and lifestyles in families with preschool children: HomeStyles, a randomized controlled trial. *Contemp Clin Trials*. 2018 Jan;64:139-151. doi: 10.1016/j.cct.2017.10.012.

Brazilian mothers information sources physical activity

15. O'Connor, T. M., Cerin, E., Hughes, S. O., Robles, J., Thompson, D., Baranowski, T., ... Shewchuk, R. M. (2013). What Hispanic parents do to encourage and discourage 3-4 year old children to be active: A qualitative study using nominal group technique. *International Journal of Behavioral Nutrition and Physical Activity*, 10, 93. doi:10.1186/1479-5868-10-93

16. O'Connor, T. M., Chen, T. A., Baranowski, J., Thompson, D., & Baranowski, T. (2013). Physical activity and screen-media-related parenting practices have different associations with children's objectively measured physical activity. *Childhood Obesity*, 9(5), 446-453.

17. Cespedes EM, McDonald J, Haines J, Bottino CJ, Schmidt ME, Taveras EM. Obesity-related behaviors of US- and non-US-born parents and children in low-income households. *J Dev Behav Pediatr*. 2013 Oct;34(8):541-8. doi: 10.1097/DBP.0b013e3182a509fb.

18. Downing KL, Hinkley T, Hesketh KD. Associations of Parental Rules and Socioeconomic Position With Preschool Children's Sedentary Behaviour and Screen Time. *J Phys Act Health*. 2015 Apr;12(4):515-21. doi: 10.1123/jpah.2013-0427. Epub 2014 Aug 22.

19. Pearson N, Salmon J, Crawford D, Campbell K, Timperio A. Are parental concerns for child TV viewing associated with child TV viewing and the home sedentary environment? *Int J Behav Nutr Phys Act*. 2011 Sep 27;8:102. doi: 10.1186/1479-5868-8-102.

20. Jago R, Sebire SJ, Edwards MJ, Thompson JL. Parental TV viewing, parental self-efficacy, media equipment and TV viewing among preschool children. *Eur J Pediatr*. 2013 Nov;172(11):1543-5. doi: 10.1007/s00431-013-2077-5.

21. Jago R, Stamatakis E, Gama A, Carvalhal IM, Nogueira H, Rosado V, Padez C. Parent and child screen-viewing time and home media environment. *Am J Prev Med*. 2012 Aug;43(2):150-8. doi: 10.1016/j.amepre.2012.04.012.

22. Zecevic, C. A., Tremblay, L., Lovsin, T., & Michel, L. (2010). Parental influence on young children's physical activity. *International Journal of Pediatrics*, 2010, 468-526. doi:10.1155/2010/468526.

23. Lindsay AC, Greaney ML, Wallington SF, Mesa T, Salas CF. A review of early influences on physical activity and sedentary behaviors of preschool-age children in high-income countries. *J Spec Pediatr Nurs*. 2017 Jul;22(3). doi: 10.1111/jspn.12182. Epub 2017 Apr 13. Review.

24. Smith BJ, Grunseit A, Hardy LL, King L, Wolfenden L, Milat A. (2010). Parental influences on child physical activity and screen viewing time: a population based study. *BMC Public Health*, 10:593. doi: 10.1186/1471-2458-10-593.

25. Finkelstein DM, Petersen DM, Schottenfeld LS. Promoting Children's Physical Activity in Low-Income Communities in Colorado: What Are the Barriers and Opportunities? *Prev Chronic Dis*. 2017 Dec 14;14:E134. doi: 10.5888/pcd14.170111.

26. Hammersley ML, Jones RA, Okely AD. Time2bHealthy - An online childhood obesity prevention program for preschool-aged children: A randomised controlled trial protocol. *Contemp Clin Trials*. 2017 Oct;61:73-80. doi: 10.1016/j.cct.2017.07.022.

27. Marsh S, Foley LS, Wilks DC, Maddison R. Family-based interventions for reducing sedentary time in youth: a systematic review of randomized controlled trials. *Obes Rev*. 2014 Feb;15(2):117-33. doi: 10.1111/obr.12105.

28. Stanley RM, Jones RA, Cliff DP, Trost SG, Berthelsen D, Salmon J, Batterham M, Eckermann S, Reilly JJ, Brown N, Mickle KJ, Howard SJ, Hinkley T, Janssen X, Chandler P, Cross P, Gowers F, Okely AD. Increasing physical activity among young children from disadvantaged communities: study protocol of a group randomised controlled effectiveness trial. *BMC Public Health*. 2016 Oct 19;16(1):1095.

Brazilian mothers information sources physical activity

29. Davis RE, Cole SM, McKenney-Shubert SJ, Jones SJ, Peterson KE. An Exploration of How Mexican American WIC Mothers Obtain Information About Behaviors Associated With Childhood Obesity Risk. *J Nutr Educ Behav*. 2017 Mar;49(3):187-195.e1. doi: 10.1016/j.jneb.2016.10.002.
30. Rooks RN, Wiltshire JC, Elder K, BeLue R, Gary LC Health information seeking and use outside of the medical encounter: is it associated with race and ethnicity? *Soc Sci Med*, 74 (2012), pp. 176-184
31. Brown A, Lopez MH. Public libraries and Hispanics: immigrant Hispanics use libraries less, but those who do appreciate them the most Pew Research Center, Washington, DC (2015), pp. 1-38
32. Powe BD. Health Information Seeking Among Rural African Americans, Caucasians, and Hispanics: It Is Built, Did They Come? *Nurs Clin North Am*. 2015 Sep;50(3):531-43. doi: 10.1016/j.cnur.2015.05.007.
33. Lindsay, A. C., Wallington, S. F., Greaney, M. L., Hasselman, M. H., Machado, M. M., Mezzavilla, R. S., & Detoro, B. M. (2017). Sociocultural and environmental influences on Brazilian immigrant mothers' beliefs and practices related to child feeding and weight status. *Maternal and Child Health Journal*, 21(5), 1085–1094.doi:10.1007/s10995-016-2207-6
34. Lindsay, A. C., de Oliveira, M. G., Wallington, S. F., Greaney, M. L., Machado, M. M., Freitag Pagliuca, L. M., & Arruda, C. A. (2016). Access and utilization of healthcare services in Massachusetts, United States: a qualitative study of the perspectives and experiences of Brazilian-born immigrant women. *BMC Health Services Research*, 16, 467. doi:10.1186/s12913-016-1723-9
35. Lindsay, A. C., Wallington, S. F., Greaney, M. L., Hasselman, M. H., Tavares Machado, M. M., & Mezzavilla, R. S. (2016). Brazilian immigrant mothers' beliefs and practices related to infant feeding: A qualitative study. *Journal of Human Lactation*. doi:10.1177/0890334416676267
36. Culley L, Hudson N, Rapport F. Using focus groups with minority ethnic communities: Researching infertility in British South Asian communities. *Qual Health Res*. 2007;17(1):102-12.
37. Kidd PS, Parshall MB. Getting the focus and the group: enhancing analytical rigor in focus group research. *Qual Health Res*. 2000;10(3):293-308.
38. Faugier J, Sargeat M. (1997). Sampling hard to reach populations. *Journal of Advanced Nursing* 1997; 26:790-797.
39. Marin G, Sabogal F, Marin BV, et al. Development of a short acculturation scale for Hispanics. *Hispanic J Behav Sci*. 1987:183-205.
40. Marin G, Gamba R. A new measurement of acculturation for Hispanics: The bidimensional acculturation scale for Hispanics (BAS) *Hispanic J Behav Sci*. 1996:297-316.
41. Miles M, Huberman A. 1994. Qualitative data analysis. 2nd ed. Thousand Oaks: Sage Publications.
42. Ritchie J, Spencer L, O'Connor W. 2004. Carrying out qualitative analysis. In Ritchie J, Lewis J (eds) *Qualitative research practice*. pp 219–262. London: Sage Publications.
43. Vaismoradi M, Turunen H, Bondas T. Content analysis and thematic analysis: implications for conducting a qualitative descriptive study. *Nurs Health Sci*. 2013;15(3):398-405. doi:10.1111/nhs.12048
44. parents' access to sound information about these early health behaviors

Brazilian mothers information sources physical activity

45. Davies MA, Terhorst L, Nakonechny AJ, Skukla N, El Saadawi G. The development and effectiveness of a health information website designed to improve parents' self-efficacy in managing risk for obesity in preschoolers. *J Spec Pediatr Nurs.* 2014 Oct;19(4):316-30. doi: 10.1111/jspn.12086.

46. Zhao S. Parental education and children's online health information seeking: beyond the digital divide debate. *Soc Sci Med.* 2009 Nov;69(10):1501-5. doi: 10.1016/j.socscimed.2009.08.039.

47. Hammersley ML, Jones RA, Okely AD. Parent-Focused Childhood and Adolescent Overweight and Obesity eHealth Interventions: A Systematic Review and Meta-Analysis. *J Med Internet Res.* 2016 Jul 21;18(7):e203. doi: 10.2196/jmir.5893.

48. Randle M, Okely AD, Dolnicar S. Communicating with parents of obese children: which channels are most effective? *Health Expect.* 2017 Apr;20(2):349-360. doi: 10.1111/hex.12463.

49. Schmidt ME, Haines J, O'Brien A, McDonald J, Price S, Sherry B, Taveras EM. Systematic review of effective strategies for reducing screen time among young children. *Obesity (Silver Spring).* 2012 Jul;20(7):1338-54. doi: 10.1038/oby.2011.348.

50. Avis JL, Cave AL, Donaldson S, Ellendt C, Holt NL, Jelinski S, Martz P, Maximova K, Padwal R, Wild TC, Ball GD. Working With Parents to Prevent Childhood Obesity: Protocol for a Primary Care-Based eHealth Study. *JMIR Res Protoc.* 2015 Mar 25;4(1):e35. doi: 10.2196/resprot.4147.

51. Byrne JL, Cameron Wild T, Maximova K, Browne NE, Holt NL, Cave AJ, Martz P, Ellendt C, Ball GD. A brief eHealth tool delivered in primary care to help parents prevent childhood obesity: a randomized controlled trial. *Pediatr Obes.* 2016 Nov 10. doi: 10.1111/ijpo.12200.

52. Wright JA, Whiteley JA, Watson BL, Sheinfeld Gorin SN, Hayman LL. Tailored communications for obesity prevention in pediatric primary care: a feasibility study. *Health Educ Res.* 2017 Nov 2. doi: 10.1093/her/cyx063.

53. Janz KF, Butner KL, Pate RR. The role of pediatricians in increasing physical activity in youth. *JAMA Pediatr.* 2013 Jul;167(7):595-6. doi: 10.1001/jamapediatrics.2013.2144.

54. Sherwood NE, Levy RL, Langer SL, Senso MM, Crain AL, Hayes MG, Anderson JD, Seburg EM, Jeffery RW. Healthy Homes/Healthy Kids: a randomized trial of a pediatric primary care-based obesity prevention intervention for at-risk 5-10 year olds. *Contemp Clin Trials.* 2013 Sep;36(1):228-43. doi: 10.1016/j.cct.2013.06.017.

55. Chae J, Quick BL. An examination of the relationship between health information use and health orientation in Korean mothers: focusing on the type of health information. *J Health Commun.* 2015;20(3):275-84. doi: 10.1080/10810730.2014.925016.

56. Walker LO, Mackert MS, Ahn J, Vaughan MW, Sterling BS, Guy S, Hendrickson S. e-Health and new moms: Contextual factors associated with sources of health information. *Public Health Nurs.* 2017 Nov;34(6):561-568. doi: 10.1111/phn.12347.

57. Kind T, Huang ZJ, Farr D, Pomerantz KL. Internet and computer access and use for health information in an underserved community. *Ambul Pediatr.* 2005 Mar-Apr;5(2):117-21.

58. Park E, Kim H, Steinhoff A. Health-Related Internet Use by Informal Caregivers of Children and Adolescents: An Integrative Literature Review. *J Med Internet Res.* 2016 Mar 3;18(3):e57. doi: 10.2196/jmir.4124.

Brazilian mothers information sources physical activity

59. Khoo K, Bolt P, Babl FE, Jury S, Goldman RD. Health information seeking by parents in the Internet age. *J Paediatr Child Health*. 2008 Jul-Aug;44(7-8):419-23. doi: 10.1111/j.1440-1754.2008.01322.x.
60. Rooks RN, Wiltshire JC, Elder K, BeLue R, Gary LC. Health information seeking and use outside of the medical encounter: is it associated with race and ethnicity? *Soc Sci Med*. 2012;74: 176-184.
61. Richardson A, Allen JA, Xiao H, Vallone D. Effects of race/ethnicity and socioeconomic status on health information-seeking, confidence, and trust. *J Health Care Poor Underserved*. 2012;23:1477-1493.
62. Clayman ML, Manganello JA, Viswanath K, Hesse BW, Arora NK. Providing health messages to Hispanics/Latinos: understanding the importance of language, trust in health information sources, and media use. *J Health Commun*. 2010;15:252-263.
63. Geana MV, Kimminau KS, Greiner KA. Sources of health information in a multiethnic, underserved, urban community: does ethnicity matter? *J Health Commun*. 2011;16:583-594.
64. Standiford CJ, Nolan E, Harris M, Bernstein SJ. Improving the provision of language services at an academic medical center: ensuring high-quality health communication for limited-English-proficient patients. *Acad Med*. 2009 Dec;84(12):1693-7. doi: 10.1097/ACM.0b013e3181bf4659.
65. Sherwood NE, JaKa MM, Crain AL, Martinson BC, Hayes MG, Anderson JD. Pediatric Primary Care-Based Obesity Prevention for Parents of Preschool Children: A Pilot Study. *Child Obes*. 2015 Dec;11(6):674-82. doi: 10.1089/chi.2015.0009. Epub 2015 Oct 19.
66. Gorin AA, Wiley J, Ohannessian CM, Hernandez D, Grant A, Cloutier MM. Steps to Growing Up Healthy: a pediatric primary care based obesity prevention program for young children. *BMC Public Health*. 2014 Jan 23;14:72. doi: 10.1186/1471-2458-14-72.
67. Cloutier MM, Wiley J, Huedo-Medina T, Ohannessian CM, Grant A, Hernandez D, Gorin AA. Outcomes from a Pediatric Primary Care Weight Management Program: Steps to Growing Up Healthy. *J Pediatr*. 2015 Aug;167(2):372-7.e1. doi: 10.1016/j.jpeds.2015.05.028. Epub 2015 Jun 12.
68. McSweeney L, Araújo-Soares V, Rapley T, Adamson A. A feasibility study with process evaluation of a preschool intervention to improve child and family lifestyle behaviours. *BMC Public Health*. 2017 Mar 11;17(1):248. doi: 10.1186/s12889-017-4167-1.
69. Davis AM, Daldalian MC, Mayfield CA, Dean K, Black WR, Sampilo ML, Gonzalez-Mijares M, Suminski R. Outcomes from an urban pediatric obesity program targeting minority youth: the Healthy Hawks program. *Child Obes*. 2013 Dec;9(6):492-500. doi: 10.1089/chi.2013.0053.
70. Showell NN, Cole KW, Johnson K, DeCamp LR, Bair-Merritt M, Thornton RLJ. Neighborhood and Parental Influences on Diet and Physical Activity Behaviors in Young Low-Income Pediatric Patients. *Clin Pediatr (Phila)*. 2017 Nov;56(13):1235-1243. doi: 10.1177/0009922816684599.
71. Militello L, Melnyk BM, Hekler EB, Small L, Jacobson D. Automated Behavioral Text Messaging and Face-to-Face Intervention for Parents of Overweight or Obese Preschool Children: Results From a Pilot Study. *JMIR Mhealth Uhealth*. 2016 Mar 14;4(1):e21. doi: 10.2196/mhealth.4398.
72. Brown HE, Atkin AJ, Panter J, Wong G, Chinapaw MJ, van Sluijs EM. Family-based interventions to increase physical activity in children: a systematic review, meta-

Brazilian mothers information sources physical activity

758 analysis and realist synthesis. *Obes Rev.* 2016 Apr;17(4):345-60. doi: 10.1111/obr.12362.
759 Epub 2016 Jan 12. Review. Erratum in: *Obes Rev.* 2017 Apr;18(4):491-494.

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A qualitative study exploring how Brazilian immigrant mothers living in the United States obtain information about physical activity and screen-viewing for their preschool-aged children

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Running head: Brazilian immigrant mothers sources information about physical activity

A qualitative study exploring how Brazilian immigrant mothers living in the United States obtain information about physical activity and screen-viewing for their preschool-aged children

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ABSTRACT

Objective: Parents' access to accurate information about physical activity (PA) and screen-viewing (SV) behaviors that they understand is central to their ability to implement healthy practices and routines related to these behaviors for their preschool-aged children. To our knowledge, no existing research has examined how Brazilian-born immigrant mothers' living in the United States (U.S.) access information about PA and SV behaviors for their preschool-aged children. Therefore, the present study was designed to address this gap.

Methods: Focus group discussions (FGDs) with 37 Brazilian immigrant mothers of preschool-age children living in the U.S were conducted. Audio-recorded FGDs were transcribed verbatim in Portuguese and analyzed using thematic analyses.

Results: Analyses revealed that the mothers participating in this study did not initially actively seek out information about PA and SV for their preschool-age children, but that they received unsolicited information from multiple sources including their child's pediatrician, Women, Infant and Children (WIC) program staff, social network of Brazilian friends, and the Brazilian media. Mothers reported that this unsolicited information increased their knowledge about the importance of making sure their children were physically active and not participating in excessive SV time. This increased awareness led mothers to actively seek information about PA and SV behaviors via the Internet and through interpersonal communication with fellow Brazilian friends and family.

Conclusions: Culturally and linguistically appropriate eHealth interventions may be viable ways to provide accurate and easily understood information about PA and SV to Brazilian immigrant families of preschool-aged children. Given the value Brazilian immigrant mothers placed on the advice of their pediatricians and WIC professionals, these eHealth interventions should consider

involving pediatricians possibly through including endorsement (e.g., prescription for PA and maximum SV time). Additionally, interventions should be designed to increase parents’ skills to identify high quality online information.

Keywords: Brazilian; immigrant; mothers; information; physical activity; screen-viewing

Strengths and limitations of this study:

- Brazilians are a rapidly increasing Latino immigrant population sub-group in the U.S.: however, little research has focused on health-related behaviors that may affect Brazilian immigrant children’s health.
- Study findings revealed that the Brazilian immigrant mothers participating in this study did not initially seek out information about PA and SV for their preschool-age children, but received unsolicited information from multiple sources (e.g., health care professionals, social networks of friends, Brazilian media, etc.).
- Despite widespread use of the Internet to obtain information about PA and SV in their native language, routine health care visits with pediatricians and WIC staff emerged as important sources of unsolicited information about PA and SV.
- Culturally and linguistically suitable eHealth interventions may be viable ways to provide accurate information about PA and SV to Brazilian immigrant families of preschool-aged children. Study findings suggest the importance of involving health care professionals (pediatricians and WIC staff) in interventions.
- Study results should be considered in light of study limitations, including limited generalizability due to purposive sampling. There also is possibility of selection bias as

80 mothers with a heightened interest in or awareness of the importance of child health
81 behaviors may have been more likely to participate in the study.

Brazilian mothers information sources physical activity

In the U.S., the National Association for Sport and Physical Education (NASPE) recommends that preschoolers engage in at least 60 minutes of structured PA and 60 minutes of unstructured or spontaneous active play daily for a combined minimum of 120 minutes of PA daily [8]. Similarly, the American Academy of Pediatrics (AAP) recommends that clinicians encourage parents to increase their children's PA and decrease time children spend in sedentary activities (e.g., screen-time/screen-viewing, time spent indoors, etc.) in a manner compatible with the developmental level of a child [9]. In addition, due to the increasing rates of sedentary behaviors (SB) among preschool-aged children [9-11], several countries including the U.S. have developed screen-viewing (SV) guidelines. For example, the AAP recommends that SV time not exceed two hours per day for children over two years of age [9].

Mounting evidence points to the unique and central role parents play in helping their children develop early healthy PA and SV behaviors [12-25]. One way parents influence their children's PA and SV behaviors is through their parenting practices [14-16,18]. Parents' access to information about PA and SV behaviors that is accurate and that they easily understand, is essential to their ability to promote practices conducive to healthy PA and SV behaviors for their children [25-27]. Access to comprehensible information is especially important for minority low-income parents who may face additional barriers (e.g., limited or lack of access to quality health care, language barriers, etc.) to obtaining health-related information that they understand [28,29].

Despite the importance of parents' accessing accurate information about PA and SV behaviors for their young children, there is little available research examining how and from whom low-income, immigrant parents seek and obtain this information [29]. While current research indicates that parents receive health-related information from a range of sources including books, magazines, the Internet, family, friends, and health professionals [30-32], no

Brazilian mothers information sources physical activity

existing research, to our knowledge, has examined how Brazilian-born immigrant mothers’ living in the U.S. access information about PA and SV behaviors for their young children. This information is crucial for the design of culturally appropriate early childhood obesity prevention interventions tailored to this ethnic group. Therefore, the aim of this exploratory study was to investigate how Brazilian-born immigrant mothers living in the U.S. obtain information about PA and SV behaviors for their preschool-aged children.

METHODS

Design, Setting and Sample

This study was conducted in two cities in MA: Somerville and Everett. The present qualitative study was part of a larger ongoing mixed-methods research study (to date 113 unique families) with Brazilian families living in the Greater Boston, MA examining parenting styles and parenting practices (e.g., promoting healthy eating, PA, and sleep; limiting sedentary time and screen-viewing) related to the risk of childhood obesity [33-35].

Focus group discussions (FGDs) were used to gain an in-depth understanding of how Brazilian-born immigrant mothers living in the U.S. obtain information about PA and SV behaviors for their preschool-aged children. FGDs are valuable techniques for working in diverse cultural settings as they yield rich information [36] as the synergistic effects of the group settings elicit ideas and discussion that may not arise in individual interviews [37].

This study received ethical approval from the University of Massachusetts–Boston Ethics Board (IRB # 2013060).

Patient and Public Involvement

This study did not involve any patients. Public involvement in this study was a minimum and included collaboration on posting of flyers at local Brazilian businesses and community

Brazilian mothers information sources physical activity

151 health services organization, as well as public announcements at masses and events at local,
152 predominantly Brazilian churches in Boston area.

153 **Data Collection**

154 A convenience sample of mothers was recruited between March–August 2017 from two
155 predominantly Brazilian churches, local Brazilian businesses, and community-based social and
156 health services organizations in the Greater Boston area (MA). Participants were recruited
157 through flyers posted at local Brazilian businesses and community-based social and health
158 services agencies, as well as through announcements and events at predominantly Brazilian
159 churches. Interested participants called the phone number listed on the flyer or spoke to study
160 staff at church events. Study staff assessed eligibility, and women were invited to participate if
161 they had at least one child aged 2–5 years, were of Brazilian ethnicity, born in Brazil, and had
162 been living in the U.S. for at least 12 months. In addition, participants were recruited using a
163 snowball technique [38], with women enrolled in the study asking their Brazilian friends with
164 preschool-aged children if they would be interested in participating in the study [38].

165 Seven FGDs (range of 4 to 7 participants per FGD) with a total of 37 Brazilian immigrant
166 mothers were held at the two local churches between April and August 2017. Of the 37 mothers,
167 seven were recruited through the use of snowball sampling technique.

168 Before each FGD, the moderator explained in Portuguese the study's purpose, FGD
169 procedures, study confidentiality, and obtained written informed consent from all participants. A
170 native Brazilian-Portuguese speaker (ACL) trained in qualitative research methods moderated all
171 FGDs in Portuguese using a semi-structured discussion guide that explored participants': 1)
172 information-seeking about PA and SV; and 2) sources of information about PA and SV for their
173 young children. The guide also explored mothers' beliefs, attitudes and practices related to PA

Brazilian mothers information sources physical activity

and SB (e.g., screen-time/screen-viewing) and sleep and bedtime routines. Results from these topics are presented elsewhere [39].

The guide was piloted in a FGD with a small group of Brazilian immigrant mothers (n = 4) and then refined (e.g., rewording some questions and changing the order of some questions) prior to use. Data from the pilot FGD were not included in the present study.

Before each FGD started, participants were asked to think about their preschool-aged children when participating in the discussion. A trained, bilingual (Portuguese and English) research assistant (GDA) took notes during all FGDs, which were audio-recorded and lasted between 60-80 minutes. The moderator and research assistant met for about 15 minutes after each FGD to identify new and review recurring themes, which were entered into a grid that was used to closely follow emerging themes and to determine when data saturation was reached. Lastly, at the end of each FGD participants completed a brief, self-administered questionnaire in Portuguese that assessed education, marital status, access to health care services including participation in government-sponsored health and nutrition programs (e.g., WIC, Supplemental Nutrition Assistance Program (SNAP) also known as “food stamps”, etc.), country of origin, length of time living in the U.S., and acculturation, which was assessed via the Short Acculturation Scale for Hispanics (SASH), a 12-item measure scale validated for use in Latinos, including Mexican Americans, Cuban Americans, Puerto Ricans, Dominicans, and Central and South Americans. The SASH assesses language use, media use, and ethnic social relations [40], and items are measured on a scale of 1–5 (1=least acculturated, 5=fully acculturated), and an acculturation score was computed by averaging across the 12 items.

Brazilian mothers information sources physical activity

195 Analysis

196 A professional transcriptionist and native Brazilian speaker transcribed all audio
197 recordings verbatim. The Portuguese transcripts were analyzed using thematic analysis, an
198 iterative process of coding the data in phases to create meaningful patterns [41-43] by two
199 experienced qualitative researchers who are native Portuguese speakers (ACL, CAMA). Each
200 researcher read several transcripts numerous times to become familiar with the content and
201 generate initial codes [42,43]. The researchers then manually coded transcripts independently,
202 but met regularly to discuss coding and to identify and resolve disagreements in coding [43]. The
203 coded text describing similar ideas were grouped and sorted to identify emergent themes and
204 subthemes. Finally, salient text passages were extracted, and translated into English to be used as
205 illustrative quotes for the emergent themes. Descriptive statistics and frequencies were calculated
206 for data collected in the socio-demographic survey using Microsoft Excel 2008.

207 RESULTS

208 Seven FGDs were conducted before saturation was reached, with no new themes or
209 subthemes emerging during the final group. Mothers' (n = 37) were 26 to 41 (M = 35.3, SD =
210 2.8) years old. Approximately 92% (n = 34) of participants were married with two children on
211 average. Most (72%; n = 21) had graduated from high school, and owned their own
212 housecleaning business (92%; n = 34). Approximately half (51%; n = 19) reported a family
213 income of \$40,000 or less, which in the U.S. is considered low-income for a family of four,
214 while the remainder reported an annual income between 40,000 - \$60,000, which is considered a
215 low-middle income. All mothers reported having access to health care services either through
216 government-sponsored (MassHealth, 89.2% n = 33) or private health insurance through work
217 (10.8%, n = 4), and regularly taking their children for health care visits (e.g., well and sick-visits)

Brazilian mothers information sources physical activity

and public health and nutrition services (e.g., WIC). Participants were originally from three main regions of Brazil [e.g., the Southeast (e.g., Espirito Santo, Sao Paulo, and Minas Gerais), the South (e.g., Santa Catarina), the Midwest (e.g., Goias and Mato Grosso)], with the majority (64.7%; n = 22) being from the state of Minas Gerais, in the Southeast region. In addition, the majority spoke Portuguese at home (92%, n = 34), watched television programs in Portuguese (95%), and reported that the majority of their friends were Brazilians (87%). Mothers had lived in the U. S. for an average of 6.7 (SD= 2.84) years, and their mean acculturation score was 1.43 (SD=0.77), indicating that they identified more closely with Brazilian culture than with that of the U.S.

Emergent themes are presented below with representative quotes.

Theme 1: Mothers report that they did not initially actively seek information about PA and SV for their preschool-aged children.

Most mothers reported that initially they did not actively seek information about PA and SV for their preschool-age children. Some mothers said they had not thought about finding information about PA. Other mothers, however, explained that they did not seek out this information as they felt it was not needed because either they were knowledgeable about PA, or because their children were active. In fact, several mothers mentioned that young children are “naturally” physically active and therefore, they did not think it was necessary to seek advice and/or information about PA for their young children.

“... I don’t think that there is a need to worry about young children being physically active. They [young children] are always moving and busy ...” Mother #3, 2 children (8- and 3-years old)

Brazilian mothers information sources physical activity

“...In my case, I have an older one [9 years old], so I never think of asking or looking for information about PA for the little one...” Mother #16, 2 children (9- and 4-years old)

Although several mothers felt that their preschool-age children had too much SV time (e.g., use of electronics), they did not think to seek out information about SV. Mothers explained that they did not seek information about SV because although they recognized a lot of SV time could be problematic, most felt SV was an acceptable part of children’s daily lives, even young children.

“... In reality, we all know that it’s not good for the kids to be on the iPad all the time...” Mother #9, 3 children (10-, 7- and 3-years old)

“...Nowadays it is normal for little kids, even babies to be “on screen” and have electronic toys to watch cartoons... even babies, as soon as they can hold, they have an iPhone or an iPad on their hands... that’s how kids are growing these days... and it’s not only in America, it’s everywhere. In Brazil it’s the same... it’s a problem, but it’s how it is nowadays.” Mother #22, 2 children (6- and 4-years old)

Theme 2: Mothers receive unsolicited information about PA and SV from multiple sources.

Analyses revealed that mothers receive unsolicited information about PA and SV behaviors from three main sources: 1) health care professionals (pediatricians and WIC staff); 2) interpersonal communication with their social network of Brazilian friends and family members; 3) Brazilian media. In addition, public health education campaigns and health-related community-based programs and research were identified as sources of information. As discussed below, many mothers spoke of these information sources prompting them to seek additional information about PA and SV.

Health care professionals (pediatricians and WIC staff)

Brazilian mothers information sources physical activity

More than half of the mothers reported that their child’s pediatrician was an important source of unsolicited information about PA and SV behaviors. Mothers said that they did not initially seek out information about these behaviors from their pediatrician, but almost all reported that their pediatrician inquired about their child’s PA and SV habits, and shared information on current recommendations during well-child’s appointments.

“When my son was about 2-3 years old, I recall his pediatrician asking some questions about his screen-time habits... like did he have a TV in his [son] bedroom? How much TV he watched?” Mother #28, 1 child (4-years old)

“I remember one time I took my daughter to a doctor’s appointment and she had several scratches and bruises in her legs and the doctor was looking... I felt nervous and started explaining that she’s always running around non-stop and she [doctor] said that’s good sign that she’s active and then she said it was important for children to be physically active and at the end of the visit gave me some printed information...” Mother #36, 3 children (7-, 5- and 3-years old)

For many mothers, the information from their children’s doctor served as a catalyst for them to seek out additional information from their social networks of friends and family.

“Until her [daughter] doctor mentioned about too much TV and use of electronics being a problem and interfering with sleep I did not think to look for information, but after he [doctor] mentions it I started talking to my friends who also have children and that’s how I started learning...” Mother #5, 1 child (5-years old)

“... in a doctor’s visit my son’s pediatrician asked me about how much TV and other electronics he typically watched ... that got me thinking that perhaps my son was watching too much TV and videos. So, I started thinking about it more and talking with

Brazilian mothers information sources physical activity

others [friends] and looking for information ... he was indeed spending a lot of time watching videos and playing games..." Mother #19, 2 children (7- and 4-years old)

Nearly all mothers reported valuing the information they received from their pediatricians. Moreover, some mothers spoke of using repeat well-child visits as opportunities to clarify or validate PA and SV information obtained from other sources (e.g., friend and the Internet).

"In my case, I like to ask her doctor because you hear and read about all sorts of health information everywhere. Sometimes it's hard to know what's [information] good and what's not, right? So, when I take her to her medical consultation I ask her doctor because he is the expert...I feel confident on what he says. He's really good" Mother #7, 1 child (4-years old)

In addition, some mothers also mentioned that program staff at the Women, Infant and Children (WIC) was a valued source of information about PA and SV recommendations for their preschool-age children. As with their child's pediatrician, mothers mentioned that they did not seek out this information from WIC staff rather this information, especially information about SV (e.g., TV) was given during routine visits.

"Every time I take my daughter for her WIC visit, the nurse [WIC staff] asks about her foods and what she eats... she also always ask questions about the TV. It's not really about physical activity, it's more how much TV she watches ... she talks a lot that kids should not watch a lot of TV and have TV in the bedroom. Every time I go there [WIC program], she asks and talks about that..." Mother #9, 2 children (7- and 4-years old)

Brazilian mothers information sources physical activity

307 “Every time I take my daughter to her WIC appointment the WIC nurse [WIC staff] asks
308 about her eating, TV watching and if she spends too many hours watching TV or videos
309 ...” Mother #33, 3 children (11-, 8- and 3-years old)

310 *Interpersonal communication with social network members*

311 Several mothers mentioned that their conversations with fellow Brazilian immigrant
312 mothers and their family members made them to take notice of their young child’s PA and SV
313 behaviors and to seek out PA-related information, including information about existing PA
314 programs, classes, etc.

315 “[child’s name] is my first child and I did not think much about his physical activity until
316 a friend at church mentioned that she had enrolled her 3-year old son in a movement class
317 at the YMCA. That got me curious and thinking about my son and led me to seek further
318 information...” Mother #17, 1 child (3-years old)

319 Mothers spoke of valuing information from their friends and family due to their similar
320 cultural backgrounds, experiences, and shared beliefs and values. In addition, mothers valued the
321 ease of communication due to speaking in their native language. Portuguese. Moreover, several
322 mothers mentioned that their social networks provided a broad range of information about PA
323 and SV, including information about managing SV time, organized sports and classes, and
324 different types of community-based physical activities for young children.

325 “We [mothers] always talk among ourselves about our children’s health and health
326 habits... we [mothers] all struggle with the kids using the iPads too much and playing
327 games, watching videos, so we kind of inform each other of what we know...” Mother
328 #22, 2 children (6- and 4-years old)

Brazilian mothers information sources physical activity

329 “My son is 5 years old and all he wants to do is to watch videos and play games on his
330 iPad... So, I start talking with my friends who also have children his age, asking to see if
331 they had some suggestions about managing their children’s use of electronics because I
332 have to say that in my house it’s a struggle to get him [son] to want to do something else”
333 Mother #31, 2 children (6- and 4-years old)
334 “...a friend of mine told me that her son [4-years old] was doing an all ball sports class
335 (soccer, basket ball) at the local YMCA. So I signed my son up. He loves it! He’s always
336 asking me, “mom, do I have sports class today?” Mother #12, 1 child (4-years old)
337 Mothers felt that being able to discuss information about PA and SV in their native
338 language with other Brazilian mothers was particularly beneficial. Several mothers reported
339 valuing the opinion of their friends who were mothers like them, and felt a sense of social
340 support from their interactions with friends.
341 “I don’t know, it’s just easier to talk in one’s own language. We understand each other
342 and know exactly what everything means ... even if you know some English, it’s not the
343 same...” Mother #34, 3 children (7- and 3-years old)
344 “It’s helpful to hear from other mothers like us, who are also trying to manage a work
345 schedule, raising a family, and trying to make sure that the children are healthy...I am
346 very thankful that I have friends...like, from Brazil, who understand the way we raise
347 children. You know, it’s nice when you are from the same culture... It’s good to know
348 that you are not alone...” Mother #27, 2 children (7- and 5-years old)
349 Additionally, mothers reported that the information and advice from friends and family
350 influenced their parenting practices including enrolling children in sports and limiting SV.

Brazilian mothers information sources physical activity

351 “A friend of mine who has three children, one the same age as my son, mentioned that
352 she had her two sons (6- and 3-years old) enrolled in karate lessons and that her sons
353 loved it! She [friend] said it was really good for her sons, even the little one. So, I
354 decided to enroll my son... and he loves it!” Mother #6, 1 child (4-years old)
355 “...in my house now I have a rule – no iPad at the table during meals! I was talking with
356 my friend and she said that she set rules for her children because otherwise the kids are
357 on their iPad all day long. I think that’s a great idea, and I now do the same.” Mother #
358 13, 2 children (8- and 4-years old)

359 *Brazilian media*

360 About half of the mothers mentioned learning about PA and SV behaviors from media
361 outlets including Brazilian TV channels that aired Brazil programs. Several mothers viewed
362 Brazilian media outlets as providing information that was easy to grasp due to its cultural and
363 linguistic relevance.
364 “I watched a program on Globo [Brazilian TV channel] about childhood obesity and it
365 had lots of good information about children’s unhealthy habits... we live here in America
366 and sometimes we think that in Brazil things are the same way when we [parents] were
367 kids, but things have changed... it’s the same as here in America...kids not being active,
368 a lot of use of electronics ...” Mother #11, 2 children (6- and 4-years old)
369 “Sometimes on Bem Estar [“Well Being”- Brazilian TV show] they have interviews and
370 talk about children’s health. So, I hear the information and then I talk with friends, other
371 moms, you know, asking if they heard, if they know... we [moms] talk about all sorts of
372 things regarding our children amongst ourselves... and we are always learning from each
373 other...” Mother #34, 2 children (9- and 5-years old)

Brazilian mothers information sources physical activity

374 *Public health campaigns*

375 A few mothers mentioned obtaining information about PA and SV from public health
376 campaigns on TV, radio, billboards, etc. and that these campaigns were informative, and
377 increased their awareness and knowledge about the importance of these behaviors for young
378 children, which in turn led to their seeking additional information on these topics.

379 “You hear about children’s health everywhere... they have a lot of information on
380 programs... you even see it in billboards on the road. Here [U.S.] there is a big concern
381 about childhood obesity. Everywhere you turn you find information about it...” Mother
382 #35, 3 children (12-, 9- and 4-years old)

383 *Community-based programs and health-related research*

384 A couple of mothers mentioned that health-related research and community-based
385 programs offered by faith-based organizations and at other Brazilian community events as being
386 sporadic sources of information for families.

387 “...in community events sometimes we [moms] hear about childhood obesity –nutrition,
388 physical activity, and too much use of electronics by kids...a lot of the community health
389 fairs have information on children’s health, and a lot about child obesity ...” Mother #22,
390 2 children (6- and 4-years old)

391 “A couple of years ago they had a research study at our Church... I think it was called
392 Viver Bem (Live Well)? They [research staff] came several times to talk to the mothers’
393 groups. They talked about obesity, and families with children. They ask a lot questions
394 too and then if you wanted you could participate [research]... it was a lot related to
395 preventing obesity in children and they talked about physical activity and electronics and
396 TV too...” Mother #4, 4 children (9-, 7-, 5- and 3-years old)

Brazilian mothers information sources physical activity

Theme 3: Mothers use the Internet to seek out information about PA and SV in their native language.

The Internet emerged as the main information source used by mothers to seek out information about PA and SV. Almost three-quarters of the mothers reported accessing the Internet and for the range of available information in their native language via multiple platforms (computers, smartphones, tablets), with smartphones being used most often due to ease and convenience,

“Whenever I have questions, I ask Dr. Google (laughs)! The best thing is Dr. Google speaks my language [Portuguese] (more laughs). My husband sometimes asks me how do I know something is right or not? I say, I don’t really know, so let’s ask Dr. Google! (laughs)” Mother # 13, 2 children (8- and 4-years old)

Nonetheless, several mothers also mentioned feeling overwhelmed with abundance of available information, and not always being able to discern between “good” and “bad” information.

“You start looking for information and there’s just so much out there that it’s easy to get lost...it’s hard to know what’s good information and what’s not...I like that one can find out about anything in the Internet, but when it’s health I think one needs to be more careful...” Mother # 28, 2 children (7- and 3-years old)

As mentioned previously (see theme 2 – health care professionals), several mothers reported validating information that they obtained from the Internet with their children’s pediatrician.

“Whenever the doctor mentions something about screen time or physical activity during a health visit I take the opportunity to clarify any questions I might have. You know,

Brazilian mothers information sources physical activity

there's just so much information out there. I like to hear what is the doctor's [pediatrician] opinion, so I ask..." Mother #7, 1 child (4-years old)

DISCUSSION

Parents play a unique and central role in promoting their children's early development of healthy PA and SV behaviors [13-24], and it is important to consider how parents access information related to these behaviors. Therefore, the current study explored where Brazilian immigrant mothers living in the U.S. obtain information about PA and SV behaviors for their preschool-age children. This information is needed due to the dearth of research on how low-income immigrant mothers obtain information about PA and SV behaviors for their young children.

Results of this study indicate that almost all of the Brazilian immigrant mothers participating in this study did not perceive their preschool-aged children PA level as being problematic because they were active. However, almost all mothers spoke of excessive SV time as being a concern for their preschool-aged children, but also voiced an acceptance of SV time being part of their preschool-aged children's lives. Moreover, mothers in this study reported that they did not initially seek out information about PA and SV for their preschool-age children, but that they received unsolicited information from multiple sources (e.g., health care professionals, social network of Brazilian friends and family, Brazilian media, etc.) that prompted them to seek out additional information about these behaviors.

Routine encounters with pediatricians and WIC staff were identified as important sources of unsolicited information about PA and SV behaviors for mothers in the current study. Similar to previous research [44-46], study findings suggest that routine well-child visits increased mothers' awareness of the importance of early PA and SV behaviors for their children's health

Brazilian mothers information sources physical activity

and well being and this realization motivated mothers to seek out additional information from other sources [44-46]. Study findings also showed that mothers value information provided by their child's pediatrician and WIC staff, and that many take advantage of routine health encounters with their child's pediatrician to corroborate information obtained from other sources. This finding concurs with evidence documenting that health care professionals play a central role in guiding consumers to quality online health information [47,48]. Given the value mothers placed on the unsolicited and solicited advice they receive from their pediatricians and WIC staff, interventions should consider involving pediatricians and WIC staff possibly through including endorsement (e.g., prescription for PA and maximum SV time). In addition, health care professionals could ask mothers during routine visits about their use of the web to obtain information and provide some anticipatory guidance on accurate information related to PA and SB (SV) behaviors of preschool-aged children.

Consistent with previous research with other ethnic minority groups including Latinos [29, 49], we found that interpersonal communication between social networks comprised of ethnically similar friends and family members was a key source for mothers' obtaining unsolicited and solicited information about PA and SV for their preschool-age children [29]. Prior research shows that shared language, cultural beliefs and values are important factors influencing reliance on interpersonal communication with ethnically similar social networks of friends and family [50,51]. Mothers reported that speaking with other Brazilian mothers in their native language was particularly important and that they valued the information and advice about PA and SV they received. This finding is important and suggests that interventions should consider messages that address the influence from ethnic-like social support networks of Brazilian immigrant mothers [50,51]. Interventions also could be designed to include social

Brazilian mothers information sources physical activity

network members. For example, participants could be asked to enroll in a program with their best friend or mother, etc.

Results of this study revealed that the Internet is an important source of information for mothers seeking information about PA and SV behaviors for their preschool-aged children [52-55]. This finding is in agreement with previous research with other ethnic immigrant populations [46, 56,57]. Nonetheless, study findings also revealed that several mothers felt overwhelmed with the abundance of available information, and were not always able to discern the credibility of this information. In combination, these findings suggest the potential for further exploration of eHealth interventions (email, text, etc.) that also include a media literacy component to enable mothers to evaluate information sources to disseminate PA and SV information to Brazilian immigrant families with young children. Furthermore, although more research is needed, study findings suggest that increasing the availability of reliable and valid eHealth information in Portuguese language could have a positive influence on increasing awareness and promoting healthy PA and SV behaviors among low-income, minority Brazilian children of immigrant families living in the U.S. Future research should assess Brazilian immigrant mothers' health literacy levels, as well as mothers' ability to navigate the online environment including discerning trustworthy information sources and evaluating the quality of web sites [58,59].

In this study, television programs in the mothers' native language (Portuguese) emerged as an important source of information about PA and SV behaviors. Several mothers reported appreciating that these programs offered culturally relevant information that aligned with their beliefs and values. This finding is supported by prior research with other ethnic minority [60,61]. Interventions designed for immigrant Brazilian mothers living in the U.S. should take into account this potential source of information, and as much as possible assess the content of the

Brazilian mothers information sources physical activity

most popular health-related programs watched by Brazilian families to deliver information that is relevant and culturally attuned with Brazilian culture and values, mothers' health and media literacy levels, and that provides sound, state-of-the-art scientific information to this ethnic group.

Some mothers reported that public health campaigns provided information about PA and SV behaviors. Nevertheless, similar to previous studies [60-62], for some mothers, language barriers [62] appeared to influence their preference for obtaining information from other sources such as the Internet and Brazilian TV shows. Moreover, with the exception of advice received from health care professionals, mothers in this study reported a preference for accessing information about PA and SV in their native language, Portuguese. This finding is important and suggests that successful interventions will require attention to mothers' language preference (Portuguese) for delivery of information. These findings combined suggest that increased availability of campaigns in Portuguese (Brazilian) language and partnering with Brazilian ethnic media could be viable strategies to disseminate health information to Brazilian immigrant families.

A couple mothers also spoke of community health-related programs and research as a source of information about PA and SV behaviors. This finding is noteworthy and emphasizes the significance that community-based health research and programs can play in raising awareness and educating minority community groups about relevant health-related topics, despite only a couple of mothers mentioned these sources.

The mothers participating in this study had low acculturation levels and identified more closely with Brazilian culture than with U.S. culture. Previous research with other Latino population groups suggests that acculturation level is an important influence on health

Brazilian mothers information sources physical activity

information seeking-behavior and preferred sources of health information [63,64]. More acculturated individuals are more likely to seek health information and more likely to utilize electronic channels than less acculturated individuals who are more likely rely on social networks of friends for obtaining health information [63,64]. Our finding regarding Brazilian immigrant mothers' low acculturation levels, combined with results of previous research suggest that successfully interventions targeting Brazilian immigrant parents will require consideration of the target population's acculturation levels.

Finally, study findings suggest the importance of involving health care professionals (pediatricians and WIC staff) in interventions. Health care professionals could endorse behaviors (e.g., prescription of PA) as well as information delivered by eHealth interventions, which based on our findings would likely increase both legitimacy and acceptance of such interventions aimed at increasing awareness and educating Brazilian immigrant parents about PA and SV behaviors for their preschool-aged children [65,66].

LIMITATIONS AND STRENGTHS

Study results should be considered in light of study limitations. Findings are based on a nonrandom and purposeful sample of low-income, Brazilian-born immigrant mothers in two MA communities, which limits generalizability. There also is possibility of selection bias as mothers with a heightened interest in or awareness of the importance of child health behaviors may have been more likely to participate in the study. Moreover, the use of snowball sampling to recruit participants might have resulted in the recruitment of study participants who share similar beliefs, attitudes, and behaviors related to PA and SV. Thus, further research is needed to increase generalizability and to explore whether results apply to a broader group of Brazilian immigrants. In addition, this study did not objectively assess mothers' PA and SV behaviors and

Brazilian mothers information sources physical activity

535 this is a limitation given that evidence suggests that parent’s PA and SV behaviors influence
536 their children’s behaviors. Finally, the present study included only mothers and this is a
537 limitation given increasingly evidence suggesting the importance of including both parents in
538 child health promotion and obesity prevention research and interventions [67-69]. Future
539 research can address these limitations by exploring information-seeking behaviors and sources of
540 information used by low-income, minority mothers and fathers from other communities across
541 the U. S., selecting a larger sample size, and employing multiple data collection methods,
542 including both qualitative and quantitative methods, and objectively assessing parents’ and
543 children’s PA and SV behaviors.

544 **CONCLUSIONS**

545 Evidence suggests that parents need to be aware of the importance of early healthy
546 behaviors and have access to accurate information that they easily understand so they can
547 implement healthy practices and routines for their young children [70-75]. Study results indicate
548 that despite mothers’ reporting of widespread use of the Internet to obtain information in their
549 native language, routine health care visits with pediatricians emerged as an important source of
550 unsolicited information about PA and SV, and mothers favorably valued advice given by their
551 child’s pediatricians. Furthermore, mothers viewed WIC program staff providing important
552 information about PA and SV. Culturally and linguistically suitable eHealth interventions may
553 be viable ways to provide accurate and easily understood information about PA and SV to
554 Brazilian immigrant families with preschool-aged children [67-75]. Finally, more research is
555 needed to ensure Brazilian immigrant mothers’ health and media literacy including their ability
556 to navigate the online environment and to discern the accuracy and quality of information from
557 various web sites.

Brazilian mothers information sources physical activity

ABBREVIATIONS

AAP: American Academy of Pediatrics; FGD: Focus Group Discussion; MA: Massachusetts; NASPE: National Association for Sport and Physical Education; PA: physical activity; SASH: Short Acculturation Scale for Hispanics; SB: sedentary behaviors; SNAP: Supplemental Nutrition Assistance Program; SV: screen-viewing; U.S.: United States; WIC: Women, Infants and Children.

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Contributorship: ACL participated in study design, data collection, data analysis, and manuscript preparation and review. CAMA participated in qualitative data analysis, manuscript preparation, and manuscript review. MMTM participated in manuscript preparation and review. GDA in data collection and manuscript preparation and manuscript review. MLG participated in study design, manuscript preparation, and manuscript review.

Ethical Standards Disclosure: This study was approved by the Institutional Review Board for the Protection of Human Subjects at the University of Massachusetts Boston. Written and oral informed consent was obtained from all participants.

Data Sharing: Data and all other materials for this study are kept at the Department of Exercise and Health Sciences, University of Massachusetts Boston. The datasets generated during and/or analyzed during the current study are not publicly available due the terms of consent to which participants agreed to, but are available from the corresponding author on reasonable request.

REFERENCES

1. Hernandez, D. J., Denton, N. A., & Macartney, S. E. (2008). Children in immigrant families: Looking to America's future. Social Policy Report, 22(3). Retrieved from <http://www.childtrends.org/?indicators=immigrant-children>
2. Lima, A., & Siqueira, C. E. (2007). Brazilians in the U.S. and Massachusetts: A demographic and economic profile. *Gastón Institute Publications*, Paper 50. Retrieved from: http://scholarworks.umb.edu/gaston_pubs/50/
3. Jouët-Pastré, Clémence, and Leticia J. Braga. Becoming Brazuca: Brazilian Immigration to the United States. Cambridge, Mass.: David Rockefeller Center for Latin American Studies, Harvard University Press, 2008.

Brazilian mothers information sources physical activity

4. Goza, F. (1994) Brazilian immigration to North America. *International Migration Review*, 28(1), 136-152.

5. Tovar A, Hennessy E, Must A, Hughes SO, Gute DM, Sliwa S, Boulos RJ, Vikre EK, Kamins CL, Tofuri K, Pirie A, Economos CD. (2013). Feeding styles and evening family meals among recent immigrants. *Int J Behav Nutr Phys Act.*, 10:84. doi:10.1186/1479-5868-10-84.

6. O'Dwyer, M. V., Fairclough, S. J., Knowles, Z., & Stratton, G. (2012). Effect of a family focused active play intervention on sedentary time and physical activity in preschool children. *International Journal of Behavioral Nutrition and Physical Activity*, 9(1), 1-13.

7. Chuang R. J., Sharman S., Skala, K., & Evans, A. (2013). Ethnic differences in the home environment and physical activity behaviors among low-income, minority preschoolers in Texas. *American Journal of Health Promotion*, 27(4), 270-278. doi:10.4278/ajhp.110427-QUAN-171

8. National Association for Sport and Physical Education (NASPE). (2009). *Active start: A statement of physical activity guidelines for children from birth to age 5* (2nd ed.). Sewickley, PA: American Alliance for Health, Physical Education, Recreation, and Dance.

9. American Academy of Pediatrics (AAP). (2006). Active healthy living: Prevention of childhood obesity through increased physical activity. *Pediatrics*, 117, 1834-1842.

10. Commonwealth of Australia, Department of Health and Ageing. (2010). *Move and play every day: National physical activity recommendations for children 0 to 5 years*. Retrieved from [http://www.health.gov.au/internet/main/publishing.nsf/content/9D831D9E6713F92ACA257BF0001F5218/\\$File/0-5yrACTIVE_Brochure_FA%20SCREEN.pdf](http://www.health.gov.au/internet/main/publishing.nsf/content/9D831D9E6713F92ACA257BF0001F5218/$File/0-5yrACTIVE_Brochure_FA%20SCREEN.pdf)

11. Tremblay, M. S., Leblanc, A. G., Carson, V., Choquette, L., Connor Gorber, S., Dillman, C., ... Timmons, B. W. (2012). Canadian physical activity guidelines for the early years (aged 0 to 4 years). *Applied Physiology, Nutrition, and Metabolism*, 37(2), 370-391.

12. Lindsay, A. C., Sussner, K. M., Kim, J., & Gortmaker, S. (2006). The role of parents in preventing childhood obesity. *Future of Children*, 16(1), 169-186.

13. O'Connor, T. M., Cerin, E., Lee, R. E., Parker, N., Chen, T. A., Hughes, S. O., ... Baranowski, T. (2014). Environmental and cultural correlates of physical activity parenting practices among Latino parents with preschool-aged children: Niños activos. *BMC Public Health*, 14, 707. doi:10.1186/1471-2458-14-707

14. Byrd-Bredbenner C, Martin-Biggers J, Povis GA, Worobey J, Hongu N, Quick V. (2018). Promoting healthy home environments and lifestyles in families with preschool children: HomeStyles, a randomized controlled trial. *Contemp Clin Trials.*, 64:139-151. doi: 10.1016/j.cct.2017.10.012.

15. O'Connor, T. M., Cerin, E., Hughes, S. O., Robles, J., Thompson, D., Baranowski, T., ... Shewchuk, R. M. (2013). What Hispanic parents do to encourage and discourage 3-4 year old children to be active: A qualitative study using nominal group technique. *International Journal of Behavioral Nutrition and Physical Activity*, 10, 93. doi:10.1186/1479-5868-10-93

16. O'Connor, T. M., Chen, T. A., Baranowski, J., Thompson, D., & Baranowski, T. (2013). Physical activity and screen-media-related parenting practices have different associations with children's objectively measured physical activity. *Childhood Obesity*, 9(5), 446-453.

17. Cespedes EM, McDonald J, Haines J, Bottino CJ, Schmidt ME, Taveras EM. (2013). Obesity-related behaviors of US- and non-US-born parents and children in low-income households. *J Dev Behav Pediatr.*, 34(8):541-8. doi: 10.1097/DBP.0b013e3182a509fb.

Brazilian mothers information sources physical activity

18. Downing KL, Hinkley T, Hesketh KD. (2015). Associations of Parental Rules and Socioeconomic Position With Preschool Children's Sedentary Behaviour and Screen Time. *J Phys Act Health.*, 12(4):515-21. doi: 10.1123/jpah.2013-0427. Epub 2014 Aug 22.
19. Pearson N, Salmon J, Crawford D, Campbell K, Timperio A. (2011). Are parental concerns for child TV viewing associated with child TV viewing and the home sedentary environment? *Int J Behav Nutr Phys Act.*, 27;8:102. doi: 10.1186/1479-5868-8-102.
20. Jago R, Sebire SJ, Edwards MJ, Thompson JL. (2013). Parental TV viewing, parental self-efficacy, media equipment and TV viewing among preschool children. *Eur J Pediatr.*, 172(11):1543-5. doi: 10.1007/s00431-013-2077-5.
21. Jago R, Stamatakis E, Gama A, Carvalhal IM, Nogueira H, Rosado V, Padez C. (2012). Parent and child screen-viewing time and home media environment. *Am J Prev Med.*, 43(2):150-8. doi: 10.1016/j.amepre.2012.04.012.
22. Zecevic, C. A., Tremblay, L., Lovsin, T., & Michel, L. (2010). Parental influence on young children's physical activity. *International Journal of Pediatrics*, 468-526. doi:10.1155/2010/468526.
23. Lindsay AC, Greaney ML, Wallington SF, Mesa T, Salas CF. (2017). A review of early influences on physical activity and sedentary behaviors of preschool-age children in high-income countries. *J Spec Pediatr Nurs.* 22(3). doi: 10.1111/jspn.12182.
24. Smith BJ, Grunseit A, Hardy LL, King L, Wolfenden L, Milat A. (2010). Parental influences on child physical activity and screen viewing time: a population based study. *BMC Public Health.*, 10:593. doi: 10.1186/1471-2458-10-593.
25. Finkelstein DM, Petersen DM, Schottenfeld LS. (2017). Promoting Children's Physical Activity in Low-Income Communities in Colorado: What Are the Barriers and Opportunities? *Prev Chronic Dis.* 14:E134. doi: 10.5888/pcd14.170111.
26. Hammersley ML, Jones RA, Okely AD. (2017). Time2bHealthy - An online childhood obesity prevention program for preschool-aged children: A randomised controlled trial protocol. *Contemp Clin Trials.*, 61:73-80. doi: 10.1016/j.cct.2017.07.022.
27. Marsh S, Foley LS, Wilks DC, Maddison R. (2014). Family-based interventions for reducing sedentary time in youth: a systematic review of randomized controlled trials. *Obes Rev.* 15(2):117-33. doi: 10.1111/obr.12105.
28. Stanley RM, Jones RA, Cliff DP, Trost SG, Berthelsen D, Salmon J, Batterham M, Eckermann S, Reilly JJ, Brown N, Mickle KJ, Howard SJ, Hinkley T, Janssen X, Chandler P, Cross P, Gowers F, Okely AD. (2016). Increasing physical activity among young children from disadvantaged communities: study protocol of a group randomised controlled effectiveness trial. *BMC Public Health.*, 16(1):1095.
29. Davis RE, Cole SM, McKenney-Shubert SJ, Jones SJ, Peterson KE. (2017). An Exploration of How Mexican American WIC Mothers Obtain Information About Behaviors Associated With Childhood Obesity Risk. *J Nutr Educ Behav.* , 49(3):187-195.e1. doi: 10.1016/j.jneb.2016.10.002.
30. Rooks RN, Wiltshire JC, Elder K, BeLue R, Gary LC. (2012). Health information seeking and use outside of the medical encounter: is it associated with race and ethnicity? *Soc Sci Med*, 74:176-184
31. Brown A, Lopez MH. Public libraries and Hispanics: immigrant Hispanics use libraries less, but those who do appreciate them the most Pew Research Center, Washington, DC (2015), pp. 1-38

Brazilian mothers information sources physical activity

32. Powe BD. (2015). Health Information Seeking Among Rural African Americans, Caucasians, and Hispanics: It Is Built, Did They Come? *Nurs Clin North Am.*, 50(3):531-43. doi: 10.1016/j.cnur.2015.05.007.

33. Lindsay, A. C., Wallington, S. F., Greaney, M. L., Hasselman, M. H., Machado, M. M., Mezzavilla, R. S., & Detro, B. M. (2017). Sociocultural and environmental influences on Brazilian immigrant mothers' beliefs and practices related to child feeding and weight status. *Maternal and Child Health Journal*, 21(5), 1085–1094. doi:10.1007/s10995-016-2207-6

34. Lindsay, A. C., de Oliveira, M. G., Wallington, S. F., Greaney, M. L., Machado, M. M., Freitag Pagliuca, L. M., & Arruda, C. A. (2016). Access and utilization of healthcare services in Massachusetts, United States: a qualitative study of the perspectives and experiences of Brazilian-born immigrant women. *BMC Health Services Research*, 16, 467. doi:10.1186/s12913-016-1723-9

35. Lindsay, A. C., Wallington, S. F., Greaney, M. L., Hasselman, M. H., Tavares Machado, M. M., & Mezzavilla, R. S. (2016). Brazilian immigrant mothers' beliefs and practices related to infant feeding: A qualitative study. *Journal of Human Lactation*. doi:10.1177/0890334416676267

36. Culley L, Hudson N, Rapport F. (2007). Using focus groups with minority ethnic communities: Researching infertility in British South Asian communities. *Qual Health Res.* 17(1):102-12.

37. Kidd PS, Parshall MB. (2000). Getting the focus and the group: enhancing analytical rigor in focus group research. *Qual Health Res.*, 10(3):293-308.

38. Faugier J, Sargeat M. (1997). Sampling hard to reach populations. *Journal of Advanced Nursing*; 26:790-797.

39. Lindsay AC, Arruda CAM, Tavares Machado MM, Greaney ML. (in press) Social Contextual Influences on Sleep and Bedtime Routines Among Preschool-Aged Children of Brazilian Immigrant Families Living in the United States: A Qualitative Study. *Children*.

40. Marin, G., Sabogal, F., Marin, B. V., Otero-Sabogal, R., & Perez-Stable, E. J. (1987). Development of a short acculturation scale for Hispanics. *Hispanic Journal of Behavioral Sciences*, 9(2):183–205.

41. Miles M, Huberman A. (1994). *Qualitative data analysis*. 2nd ed. Thousand Oaks: Sage Publications.

42. Ritchie J, Spencer L, O'Connor W. (2004). Carrying out qualitative analysis. In Ritchie J, Lewis J (eds) *Qualitative research practice*. pp 219–262. London: Sage Publications.

43. Vaismoradi M, Turunen H, Bondas T. (2013). Content analysis and thematic analysis: implications for conducting a qualitative descriptive study. *Nurs Health Sci.* 15(3):398-405. doi:10.1111/nhs.12048

44. Byrne JL, Cameron Wild T, Maximova K, Browne NE, Holt NL, Cave AJ, Martz P, Ellendt C, Ball GD. (2016). A brief eHealth tool delivered in primary care to help parents prevent childhood obesity: a randomized controlled trial. *Pediatr Obes.* doi: 10.1111/ijpo.12200.

45. Wright JA, Whiteley JA, Watson BL, Sheinfeld Gorin SN, Hayman LL. (2017). Tailored communications for obesity prevention in pediatric primary care: a feasibility study. *Health Educ Res.* doi: 10.1093/her/cyx063.

46. Janz KF, Butner KL, Pate RR. (2013). The role of pediatricians in increasing physical activity in youth. *JAMA Pediatr.* 167(7):595-6. doi: 10.1001/jamapediatrics.2013.2144.

Brazilian mothers information sources physical activity

47. Sherwood NE, Levy RL, Langer SL, Senso MM, Crain AL, Hayes MG, Anderson JD, Seburg EM, Jeffery RW. (2013). Healthy Homes/Healthy Kids: a randomized trial of a pediatric primary care-based obesity prevention intervention for at-risk 5-10 year olds. *Contemp Clin Trials*. 36(1):228-43. doi: 10.1016/j.cct.2013.06.017.
48. Chae J, Quick BL. (2015). An examination of the relationship between health information use and health orientation in Korean mothers: focusing on the type of health information. *J Health Commun.*, 20(3):275-84. doi: 10.1080/10810730.2014.925016.
49. Walker LO, Mackert MS, Ahn J, Vaughan MW, Sterling BS, Guy S, Hendrickson S. (2017). e-Health and new moms: Contextual factors associated with sources of health information. *Public Health Nurs.* 34(6):561-568. doi: 10.1111/phn.12347.
50. Kind T, Huang ZJ, Farr D, Pomerantz KL. (2005). Internet and computer access and use for health information in an underserved community. *Ambul Pediatr.*, 5(2):117-21.
51. Park E, Kim H, Steinhoff A. Health-Related Internet Use by Informal Caregivers of Children and Adolescents: An Integrative Literature Review. *J Med Internet Res*. 2016 Mar 3;18(3):e57. doi: 10.2196/jmir.4124.
52. Khoo K, Bolt P, Babl FE, Jury S, Goldman RD. (2008). Health information seeking by parents in the Internet age. *J Paediatr Child Health.*, 44(7-8):419-23. doi: 10.1111/j.1440-1754.2008.01322.x.
53. Rooks RN, Wiltshire JC, Elder K, BeLue R, Gary LC. (2012). Health information seeking and use outside of the medical encounter: is it associated with race and ethnicity? *Soc Sci Med*. 74: 176-184.
54. Richardson A, Allen JA, Xiao H, Vallone D. (2012). Effects of race/ethnicity and socioeconomic status on health information-seeking, confidence, and trust. *J Health Care Poor Underserved*. 23:1477-1493.
55. Clayman ML, Manganello JA, Viswanath K, Hesse BW, Arora NK. (2010). Providing health messages to Hispanics/Latinos: understanding the importance of language, trust in health information sources, and media use. *J Health Commun.*, 15:252-263.
56. Geana MV, Kimminau KS, Greiner KA. Sources of health information in a multiethnic, underserved, urban community: does ethnicity matter? *J Health Commun*. 2011;16:583-594.
57. Standiford CJ, Nolan E, Harris M, Bernstein SJ. Improving the provision of language services at an academic medical center: ensuring high-quality health communication for limited-English-proficient patients. *Acad Med*. 2009 Dec;84(12):1693-7. doi: 10.1097/ACM.0b013e3181bf4659.
58. Mackert M, Kahlor L, Tyler D, Gustafson J. (2009). Designing e-health interventions for low-health-literate culturally diverse parents: addressing the obesity epidemic. *Telemed J E Health.*, 15(7):672-7. doi: 10.1089/tmj.2009.0012.
59. Hall CM, Bierman KL. (2015). Technology-assisted Interventions for Parents of Young Children: Emerging Practices, Current Research, and Future Directions. *Early Child Res Q.*;33:21-32.
60. Sherwood NE, JaKa MM, Crain AL, Martinson BC, Hayes MG, Anderson JD. (2015). Pediatric Primary Care-Based Obesity Prevention for Parents of Preschool Children: A Pilot Study. *Child Obes*. 11(6):674-82. doi: 10.1089/chi.2015.0009. Epub 2015 Oct 19.
61. Gorin AA, Wiley J, Ohannessian CM, Hernandez D, Grant A, Cloutier MM. (2014). Steps to Growing Up Healthy: a pediatric primary care based obesity prevention program for young children. *BMC Public Health*. 14:72. doi: 10.1186/1471-2458-14-72.

Brazilian mothers information sources physical activity

62. Neshteruk CD, Nezami BT, Nino-Tapias G, Davison KK, Ward DS. (2017). The influence of fathers on children's physical activity: A review of the literature from 2009 to 2015. *Prev Med.*, 102:12-19. doi: 10.1016/j.ypmed.2017.06.027.

63. Hillyer GC, Schmitt KM, Lizardo M, Reyes A, Bazan M, Alvarez MC, Sandoval R, Abdul K, Orjuela MA. (2017). Electronic Communication Channel Use and Health Information Source Preferences Among Latinos in Northern Manhattan. *J Community Health.* 42(2):349-357. doi: 10.1007/s10900-016-0261-z.

64. Roncancio AM, Berenson AB, Rahman M. (2012). Health locus of control, acculturation, and health-related Internet use among Latinas. *J Health Commun.*, 17(6):631-40. doi: 10.1080/10810730.2011.635767.

65. Morgan PJ, Young MD. (2017). The Influence of Fathers on Children's Physical Activity and Dietary Behaviors: Insights, Recommendations and Future Directions. *Curr Obes Rep.*, 6(3):324-333. doi: 10.1007/s13679-017-0275-6.

66. Lindsay AC, Wallington SF, Muñoz MA, Greaney ML. (2018). A qualitative study conducted in the USA exploring Latino fathers' beliefs, attitudes and practices related to their young children's eating, physical activity and sedentary behaviours. *Public Health Nutr* 21(2):403-415. doi: 10.1017/S1368980017002579.

67. Cloutier MM, Wiley J, Huedo-Medina T, Ohannessian CM, Grant A, Hernandez D, Gorin AA. (2015). Outcomes from a Pediatric Primary Care Weight Management Program: Steps to Growing Up Healthy. *J Pediatr.*, 167(2):372-7.e1. doi: 10.1016/j.jpeds.2015.05.028. Epub 2015 Jun 12.

68. McSweeney L, Araújo-Soares V, Rapley T, Adamson A. (2017). A feasibility study with process evaluation of a preschool intervention to improve child and family lifestyle behaviours. *BMC Public Health*, 17(1):248. doi: 10.1186/s12889-017-4167-1.

69. Davis AM, Daldalian MC, Mayfield CA, Dean K, Black WR, Sampilo ML, Gonzalez-Mijares M, Suminski R. (2013). Outcomes from an urban pediatric obesity program targeting minority youth: the Healthy Hawks program. *Child Obes.*, 9(6):492-500. doi: 10.1089/chi.2013.0053.

70. Militello L, Melnyk BM, Hekler EB, Small L, Jacobson D. (2016). Automated Behavioral Text Messaging and Face-to-Face Intervention for Parents of Overweight or Obese Preschool Children: Results From a Pilot Study. *JMIR Mhealth Uhealth.*, 4(1):e21. doi: 10.2196/mhealth.4398.

71. Brown HE, Atkin AJ, Panter J, Wong G, Chinapaw MJ, van Sluijs EM. (2016). Family-based interventions to increase physical activity in children: a systematic review, meta-analysis and realist synthesis. *Obes Rev.*, 17(4):345-60. doi: 10.1111/obr.12362. Review. Erratum in: *Obes Rev.* 2017 Apr;18(4):491-494.

72. Hammersley ML, Jones RA, Okely AD. (2016). Parent-Focused Childhood and Adolescent Overweight and Obesity eHealth Interventions: A Systematic Review and Meta-Analysis. *J Med Internet Res.*, 18(7):e203. doi: 10.2196/jmir.5893.

73. Randle M, Okely AD, Dolnicar S. (2017). Communicating with parents of obese children: which channels are most effective? *Health Expect.*, 20(2):349-360. doi: 10.1111/hex.12463.

74. Schmidt ME, Haines J, O'Brien A, McDonald J, Price S, Sherry B, Taveras EM. (2012). Systematic review of effective strategies for reducing screen time among young children. *Obesity*, 20(7):1338-54. doi: 10.1038/oby.2011.348.

75. Avis JL, Cave AL, Donaldson S, Ellendt C, Holt NL, Jelinski S, Martz P, Maximova K, Padwal R, Wild TC, Ball GD. (2015). Working With Parents to Prevent

Brazilian mothers information sources physical activity

824 Childhood Obesity: Protocol for a Primary Care-Based eHealth Study. *JMIR Res*
825 *Protoc.*, 4(1):e35. doi: 10.2196/resprot.4147.
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For peer review only

COREQ (CONsolidated criteria for REporting Qualitative research) Checklist

A checklist of items that should be included in reports of qualitative research. You must report the page number in your manuscript where you consider each of the items listed in this checklist. If you have not included this information, either revise your manuscript accordingly before submitting or note N/A.

Topic	Item No.	Guide Questions/Description	Reported on Page No.
Domain 1: Research team and reflexivity			
Personal characteristics			
Interviewer/facilitator	1	Which author/s conducted the interview or focus group?	
Credentials	2	What were the researcher's credentials? E.g. PhD, MD	
Occupation	3	What was their occupation at the time of the study?	
Gender	4	Was the researcher male or female?	
Experience and training	5	What experience or training did the researcher have?	
Relationship with participants			
Relationship established	6	Was a relationship established prior to study commencement?	
Participant knowledge of the interviewer	7	What did the participants know about the researcher? e.g. personal goals, reasons for doing the research	
Interviewer characteristics	8	What characteristics were reported about the inter viewer/facilitator? e.g. Bias, assumptions, reasons and interests in the research topic	
Domain 2: Study design			
Theoretical framework			
Methodological orientation and Theory	9	What methodological orientation was stated to underpin the study? e.g. grounded theory, discourse analysis, ethnography, phenomenology, content analysis	
Participant selection			
Sampling	10	How were participants selected? e.g. purposive, convenience, consecutive, snowball	
Method of approach	11	How were participants approached? e.g. face-to-face, telephone, mail, email	
Sample size	12	How many participants were in the study?	
Non-participation	13	How many people refused to participate or dropped out? Reasons?	
Setting			
Setting of data collection	14	Where was the data collected? e.g. home, clinic, workplace	
Presence of non-participants	15	Was anyone else present besides the participants and researchers?	
Description of sample	16	What are the important characteristics of the sample? e.g. demographic data, date	
Data collection			
Interview guide	17	Were questions, prompts, guides provided by the authors? Was it pilot tested?	
Repeat interviews	18	Were repeat inter views carried out? If yes, how many?	
Audio/visual recording	19	Did the research use audio or visual recording to collect the data?	
Field notes	20	Were field notes made during and/or after the inter view or focus group?	
Duration	21	What was the duration of the inter views or focus group?	
Data saturation	22	Was data saturation discussed?	
Transcripts returned	23	Were transcripts returned to participants for comment and/or	

Topic	Item No.	Guide Questions/Description	Reported on Page No.
		correction?	
Domain 3: analysis and findings			
<i>Data analysis</i>			
Number of data coders	24	How many data coders coded the data?	
Description of the coding tree	25	Did authors provide a description of the coding tree?	
Derivation of themes	26	Were themes identified in advance or derived from the data?	
Software	27	What software, if applicable, was used to manage the data?	
Participant checking	28	Did participants provide feedback on the findings?	
<i>Reporting</i>			
Quotations presented	29	Were participant quotations presented to illustrate the themes/findings? Was each quotation identified? e.g. participant number	
Data and findings consistent	30	Was there consistency between the data presented and the findings?	
Clarity of major themes	31	Were major themes clearly presented in the findings?	
Clarity of minor themes	32	Is there a description of diverse cases or discussion of minor themes?	

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A qualitative study exploring how Brazilian immigrant mothers living in the United States obtain information about physical activity and screen time for their preschool-aged children

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ABSTRACT

Objective: To explore how Brazilian-born immigrant mothers living in the United States (US) obtain information about physical activity (PA) and screen time (ST) behaviors for their preschool-aged children.

Research Design: Focus group discussions (FGDs) were used to gain an in-depth understanding of research topics. All FGDs were audio-recorded, and professionally transcribed verbatim. The Portuguese transcripts were analyzed using thematic analysis, an iterative process of coding the data in phases to create meaningful patterns.

Participants: Thirty-seven Brazilian-born immigrant mothers of preschool-age children.

Setting: This study was conducted in two cities in Massachusetts (MA). Participants were recruited from two predominantly Brazilian churches, local Brazilian businesses, and community-based social and health services organizations in the Greater Boston area (MA).

Results: Analyses revealed that the mothers participating in this study did not initially actively seek out information about PA and ST for their preschool-age children, but that they received unsolicited information about these behaviors from multiple sources including their child's pediatrician, Women, Infant and Children (WIC) program staff, members of their social network of Brazilian friends, and the Brazilian media. Mothers reported that this unsolicited information increased their knowledge about the importance of making sure their children were physically active and not participating in excessive ST. This increased awareness led mothers to actively seek information about PA and ST behaviors via the Internet and through interpersonal communication with fellow Brazilian friends and family.

Conclusions: Given the value Brazilian immigrant mothers placed on the advice of their pediatricians and WIC staff, interventions should consider involving these health care

Brazilian mothers information sources physical activity

professionals, possibly through including endorsement (e.g., prescription for PA and maximum ST). More research is needed to ensure Brazilian immigrant mothers’ health and media literacy including their ability to navigate the online environment and to discern the accuracy and quality of information from various web sites.

Keywords: Brazilian; immigrant; mothers; information; physical activity; screen time

Strengths and limitations of this study:

- This is the first qualitative study to our knowledge to explore how Brazilian-born immigrant mothers living in the US obtain information about PA and ST for their preschool-aged children.
- Study findings are based on a nonrandom and purposeful sample of low-income, Brazilian-born immigrant mothers in two MA communities, which limits generalizability.
- There is possibility of selection bias as mothers with a heightened interest in or awareness of the importance of child health behaviors may have been more likely to participate in the study.
- The use of snowball sampling to recruit participants might have resulted in the recruitment of study participants who share similar beliefs, attitudes, and behaviors related to PA and ST.
- The present study included only mothers and this is a limitation given increasingly evidence suggesting the importance of including both parents in child health promotion and obesity prevention research and interventions.

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81 INTRODUCTION

82 One in five children in the United States (US) is a member of an immigrant family, which
83 is defined as a family with at least one immigrant parent [1]. A large proportion of these children
84 are part of immigrant families originally from Latin America (55% of all first- and second-
85 generation immigrants in the US were of Hispanic origin in 2014), making Latinos the largest
86 and fastest growing immigrant group in the US [1].

87 Brazilians are a rapidly increasing Latino immigrant US population sub-group, yet little
88 research has focused on health-related behaviors that may affect Brazilian immigrant children's
89 health [2,3]. Although Brazilians share many cultural characteristics of other Latin American
90 population groups, Brazilians represent many different ethnic backgrounds, including Africans,
91 Europeans, and Native-Brazilians [2,3]. Portuguese is the official language of Brazil, and an
92 important cultural difference between Brazilians and other Latin American population groups
93 that primarily speak Spanish [4]. According to the 2006–2010 American Community Survey of
94 the approximately 400,000 Brazilian immigrants living in the US, nearly half live in the
95 northeastern states, mostly in Massachusetts (MA; about 19%), New York, and New Jersey [2,3].
96 A recent study conducted in the Greater Boston area of MA, found that 48.2% of Brazilian
97 immigrant children (aged 3 –12 years) were overweight or obese [5].

98 Promoting physical activity (PA) is a key component of preventing and reducing
99 childhood obesity [6-8]. Unfortunately, rates of PA among young children have declined over
100 the past decades, and most children are not accruing sufficient daily PA [6-8]. Excessive
101 sedentary behavior (e.g., screen-time) is a greater problem among racial/ethnic minority children
102 in the US, with greater prevalence of sedentary behaviors (SB) among Hispanic children than
103 non-Hispanic White children [7].

Brazilian mothers information sources physical activity

existing research, to our knowledge, has examined how Brazilian-born immigrant mothers' living in the US access information about PA and ST behaviors for their young children. This information is crucial for the design of culturally appropriate early childhood obesity prevention interventions tailored to this ethnic group. Therefore, the aim of this exploratory study was to investigate how Brazilian-born immigrant mothers living in the US obtain information about PA and ST behaviors for their preschool-aged children.

METHODS

Design, Setting and Sample

This study was conducted in two cities in MA: Somerville and Everett. The present qualitative study was part of a larger ongoing mixed-methods research study (to date 113 unique families) with Brazilian families living in the Greater Boston, MA examining parenting styles and parenting practices (e.g., promoting healthy eating, PA, and sleep; and limiting ST) related to the risk of childhood obesity [33-35].

Focus group discussions (FGDs) were used to gain an in-depth understanding of how Brazilian-born immigrant mothers living in the US obtain information about PA and ST behaviors for their preschool-aged children. FGDs are valuable techniques for working in diverse cultural settings as they yield rich information [36] as the synergistic effects of the group settings elicit ideas and discussion that may not arise in individual interviews [37].

This study received ethical approval from the University of Massachusetts–Boston Ethics Board (IRB # 2013060).

Patient and Public Involvement

This study did not involve any patients. Public involvement in this study was limited to:

- 1) collaboration of community members on posting of flyers at local Brazilian businesses and

Brazilian mothers information sources physical activity

community health services organization and public announcements at masses and events at local and predominantly Brazilian churches in the Greater Boston area; and 2) participation in FGDs.

Data Collection

A convenience sample of mothers was recruited between March–August 2017 from two predominantly Brazilian churches, local Brazilian businesses, and community-based social and health services organizations in the Greater Boston area (MA). Participants were recruited through flyers posted at local Brazilian businesses and community-based social and health services agencies, as well as through announcements and events at predominantly Brazilian churches. Interested participants called the phone number listed on the flyer or spoke to study staff at church events. Study staff assessed eligibility and women were eligible to participate if they had at least one child aged 2–5 years, were of Brazilian ethnicity, born in Brazil, and had been living in the US for at least 12 months. In addition, participants were recruited using a snowball technique [38], with women enrolled in the study asking their Brazilian friends with preschool-aged children if they would be interested in participating in the study [38].

Seven FGDs (range of 4 to 7 participants per FGD) with a total of 37 Brazilian immigrant mothers were held at the two local churches between April and August 2017. Of the 37 mothers, seven (approximately 19%) were recruited through the use of snowball sampling technique.

Before each FGD, the moderator explained in Portuguese the study’s purpose, FGD procedures, study confidentiality, and obtained written informed consent from all participants. A native Brazilian-Portuguese speaker (ACL) trained in qualitative research methods moderated all FGDs in Portuguese using a semi-structured discussion guide that explored participants’: 1) information-seeking about PA and ST; and 2) sources of information about PA and ST behaviors

Brazilian mothers information sources physical activity

for their young children. The guide also explored mothers' beliefs, attitudes, and practices related to PA, ST, sleep and bedtime routines. Results from these topics are presented elsewhere [39].

The guide was piloted in a FGD with a small group of Brazilian immigrant mothers (n = 4) and then refined (e.g., rewording some questions and changing the order of some questions) prior to use. Data from the pilot FGD were not included in the present study.

Before each FGD started, participants were asked to think about their preschool-aged children when participating in the discussion. A trained, bilingual (Portuguese and English) research assistant (GDA) took notes during all FGDs, which were audio-recorded and lasted between 60-80 minutes. The moderator and research assistant met for about 15 minutes after each FGD to identify new and review recurring themes, which were entered into a grid that was used to closely follow emerging themes and to determine when data saturation was reached.

Lastly, at the end of each FGD participants completed a brief, self-administered questionnaire in Portuguese that assessed education, marital status, access to health care services including participation in government-sponsored health and nutrition programs (e.g., WIC, Supplemental Nutrition Assistance Program (SNAP), etc.), country of origin, length of time living in the US, and acculturation, which was assessed via the Short Acculturation Scale for Hispanics (SASH), a 12-item measure scale validated for use in Latinos, including Mexican Americans, Cuban Americans, Puerto Ricans, Dominicans, and Central and South Americans. The SASH assesses language use, media use, and ethnic social relations [40], and items are measured on a scale of 1–5 (1 = least acculturated, 5 = fully acculturated), and an acculturation score was computed by averaging across the 12 items.

Brazilian mothers information sources physical activity

Analysis

A professional transcriptionist and native Brazilian speaker transcribed all audio recordings verbatim. The Portuguese transcripts were analyzed using thematic analysis, an iterative process of coding the data in phases to create meaningful patterns [41-43] by two experienced qualitative researchers who are native Portuguese speakers (ACL, CAMA). Each researcher read several transcripts numerous times to become familiar with the content and generate initial codes [42,43]. The researchers then manually coded transcripts independently, but met regularly to discuss coding and to identify and resolve disagreements in coding [43]. The coded text describing similar ideas were grouped and sorted to identify emergent themes and subthemes. Finally, salient text passages were extracted, and translated into English to be used as illustrative quotes for the emergent themes. Descriptive statistics and frequencies were calculated for data collected in the socio-demographic survey using Microsoft Excel 2008.

RESULTS

Seven FGDs were conducted before saturation was reached, with no new themes or subthemes emerging during the final group. Mothers' (n = 37) ages ranged from 26 to 41 (M = 35.3, SD = 2.8). The majority of participants was married (92%; n = 34) and approximately 89% had two children (n = 33). Most (72%; n = 21) had graduated from high school, and owned their own housecleaning business (92%; n = 34). Approximately half (51%; n = 19) reported a family income of \$40,000 or less, which in the US is considered low-income for a family of four, while the remainder reported an annual income between 40,000 - \$60,000, which is considered to be a low-middle income. All mothers reported having access to health care services through government-sponsored insurance (MassHealth, 89.2% n = 33) or private health insurance through work (10.8%, n = 4). In addition, mothers reported that they regularly took their children

Brazilian mothers information sources physical activity

for health care visits (e.g., well and sick-visits) and public health and nutrition services (e.g., WIC).

Participants were originally from three main regions of Brazil [e.g., the Southeast (e.g., Espirito Santo, Sao Paulo, and Minas Gerais), the South (e.g., Santa Catarina), the Midwest (e.g., Goias and Mato Grosso)], with the majority (64.7%; $n = 22$) being from the state of Minas Gerais, in the Southeast region. In addition, the majority spoke Portuguese at home (92%, $n = 34$), watched television programs in Portuguese (95%), and reported that the majority of their friends were Brazilians (87%). Mothers had lived in the US for an average of 6.7 (SD = 2.84) years, and their mean acculturation score was 1.43 (SD = 0.77), indicating that they identified more closely with Brazilian culture than with that of the US.

Emergent themes identified in the analyses are presented below with representative quotes.

Theme 1: Mothers report that they did not initially actively seek information about PA and ST for their preschool-aged children.

Most mothers reported that initially they did not actively seek information about PA and ST for their preschool-age children. Some mothers said they had not thought about finding information about PA. Other mothers, however, explained that they did not seek out this information as they felt it was not needed because either they were knowledgeable about PA or because their children were active. In fact, several mothers mentioned that young children are “naturally” physically active and therefore, they did not think it was necessary to seek advice and/or information about PA for their young children.

“...In my case, I have an older one [9 years old], so I never think of asking or looking for information about PA for the little one...” Mother #16, 2 children (9- and 4-years old)

Brazilian mothers information sources physical activity

239 “... I don’t think that there is a need to worry about young children being physically
240 active. They [young children] are always moving and busy ...” Mother #3, 2 children (8-
241 and 3-years old)

242 Although several mothers felt that their preschool-age children had too much ST time
243 (e.g., TV watching and use of electronics), they did not think to seek out information about ST.
244 Mothers explained that they did not seek out information because although they recognized a lot
245 of ST could be problematic, most felt ST was an acceptable part of children’s daily lives, even
246 young children.

247 “... In reality, we all know that it’s not good for the kids to be on the iPad all the time...”
248 Mother #9, 3 children (10-, 7- and 3-years old)

249 “...Nowadays it is normal for little kids, even babies to be “on screen” and have
250 electronic toys to watch cartoons... even babies, as soon as they can hold, they have an
251 iPhone or an iPad on their hands... that’s how kids are growing these days... and it’s not
252 only in the United States, it’s everywhere. In Brazil it’s the same... it’s a problem, but
253 it’s how it is nowadays.” Mother #22, 2 children (6- and 4-years old)

254 **Theme 2: Mothers receive unsolicited information about PA and ST from multiple sources.**

255 Analyses revealed that mothers receive unsolicited information about PA and ST
256 behaviors from three main sources: 1) health care professionals (pediatricians and WIC staff); 2)
257 interpersonal communication with their social network of Brazilian friends and family members;
258 and 3) Brazilian media. In addition, public health education campaigns and community-based
259 programs and health-related research were identified as sources of information. As discussed

Brazilian mothers information sources physical activity

below, many mothers spoke of these information sources prompting them to seek additional information about PA and ST.

Health care professionals (pediatricians and WIC staff)

More than half of the mothers reported that their child's pediatrician was an important source of unsolicited information about PA and ST behaviors. Mothers said that they did not initially seek out information about these behaviors from their pediatrician, but almost all reported that their pediatrician inquired about their child's PA and ST behaviors, and shared information on current recommendations during well-child's appointments.

“When my son was about 2-3 years old, I recall his pediatrician asking some questions about his screen-time habits... like did he have a TV in his [son] bedroom? How much TV he watched?” Mother #28, 1 child (4-years old)

“I remember one time I took my daughter to a doctor's appointment and she had several scratches and bruises in her legs and the doctor was looking... I felt nervous and started explaining that she's always running around non-stop and she [doctor] said that's good sign that she's active and then she said it was important for children to be physically active and at the end of the visit gave me some printed information...” Mother #36, 3 children (7-, 5- and 3-years old)

For many mothers, the information from their children's doctor served as a catalyst for them to seek out additional information from their social networks of friends and family.

“Until her [daughter's] doctor mentioned about too much TV and use of electronics being a problem and interfering with sleep I did not think to look for information, but after he

Brazilian mothers information sources physical activity

[doctor] mentions it I started talking to my friends who also have children and that's how I started learning..." Mother #5, 1 child (5-years old)

"... in a doctor's visit my son's pediatrician asked me about how much TV and other electronics he typically watched ... that got me thinking that perhaps my son was watching too much TV and videos. So, I started thinking about it more and talking with others [friends] and looking for information ... he was indeed spending a lot of time watching videos and playing games..." Mother #19, 2 children (7- and 4-years old)

Nearly all mothers reported valuing the information they received from their pediatricians. Moreover, some mothers spoke of using repeated well-child visits as opportunities to clarify or validate PA and ST information obtained from other sources (e.g., friend and the Internet).

"In my case, I like to ask her doctor because you hear and read about all sorts of health information everywhere. Sometimes it's hard to know what's [information] good and what's not, right? So, when I take her to her medical consultation I ask her doctor because he is the expert...I feel confident on what he says. He's really good" Mother #7, 1 child (4-years old)

In addition, some mothers also mentioned that program staff at the WIC was a valued source of information about PA and ST recommendations for their preschool-age children. As with their child's pediatrician, mothers mentioned that they did not seek out this information from WIC staff rather this information, especially information about ST (e.g., TV viewing) was given during routine visits.

Brazilian mothers information sources physical activity

“Every time I take my daughter for her WIC visit, the nurse [WIC staff] asks about her foods and what she eats... she also always ask questions about the TV. It’s not really about physical activity, it’s more how much TV she watches ... she talks a lot that kids should not watch a lot of TV and have TV in the bedroom. Every time I go there [WIC program], she asks and talks about that...” Mother #9, 2 children (7- and 4-years old)

“Every time I take my daughter to her WIC appointment the WIC nurse [WIC staff] asks about her eating, TV watching and if she spends too many hours watching TV or videos ...” Mother #33, 3 children (11-, 8- and 3-years old)

Interpersonal communication with social network members

Several mothers mentioned that their conversations with fellow Brazilian immigrant mothers and their family members made them to take notice of their young child’s PA and ST behaviors and to seek out PA-related information, including information about existing PA programs, classes, etc.

“[child’s name] is my first child and I did not think much about his physical activity until a friend at church mentioned that she had enrolled her 3-year old son in a movement class at the YMCA. That got me curious and thinking about my son and led me to seek further information...” Mother #17, 1 child (3-years old)

Mothers spoke of valuing information from their friends and family due to their similar cultural backgrounds, experiences, and shared beliefs and values. In addition, mothers valued the ease of communication due to speaking in their native language, Portuguese. Moreover, several mothers mentioned that their social networks provided a broad range of information about PA

Brazilian mothers information sources physical activity

and ST, including information about managing ST and organized sports and classes for young children.

“We [mothers] always talk among ourselves about our children’s health and health habits... we [mothers] all struggle with the kids using the iPads too much and playing games, watching videos, so we kind of inform each other of what we know...” Mother #22, 2 children (6- and 4-years old)

“My son is 5 years old and all he wants to do is to watch videos and play games on his iPad... So, I start talking with my friends who also have children his age, asking to see if they had some suggestions about managing their children’s use of electronics because I have to say that in my house it’s a struggle to get him [son] to want to do something else” Mother #31, 2 children (6- and 4-years old)

“...a friend of mine told me that her son [4-years old] was doing an all ball sports class (soccer, basket ball) at the local YMCA. So I signed my son up. He loves it! He’s always asking me, “mom, do I have sports class today?” Mother #12, 1 child (4-years old)

Mothers felt that being able to discuss information about PA and ST in their native language with other Brazilian mothers was particularly beneficial. Several mothers reported valuing the opinion of their friends who were mothers like them, and felt a sense of social support from their interactions with friends.

“I don’t know, it’s just easier to talk in one’s own language. We understand each other and know exactly what everything means... even if you know some English, it’s not the same...” Mother #34, 3 children (7- and 3-years old)

Brazilian mothers information sources physical activity

“It’s helpful to hear from other mothers like us, who are also trying to manage a work schedule, raising a family, and trying to make sure that the children are healthy...I am very thankful that I have friends...like, from Brazil, who understand the way we raise children. You know, it’s nice when you are from the same culture... It’s good to know that you are not alone...” Mother #27, 2 children (7- and 5-years old)

Additionally, mothers reported that the information and advice from friends and family influenced their parenting practices including enrolling children in sports and limiting ST.

“A friend of mine who has three children, one the same age as my son, mentioned that she had her two sons (6- and 3-years old) enrolled in karate lessons and that her sons loved it! She [friend] said it was really good for her sons, even the little one. So, I decided to enroll my son... and he loves it!” Mother #6, 1 child (4-years old)

“...in my house now I have a rule – no iPad at the table during meals! I was talking with my friend and she said that she set rules for her children because otherwise the kids are on their iPad all day long. I think that’s a great idea, and I now do the same.” Mother #13, 2 children (8- and 4-years old)

Brazilian media

About half of the mothers mentioned learning about PA and ST behaviors from media outlets including Brazilian TV channels that aired Brazilian programs. Several mothers viewed these media outlets as providing information that was easy to grasp due to its cultural and linguistic relevance.

Brazilian mothers information sources physical activity

364 “I watched a program on Globo [Brazilian TV channel] about childhood obesity and it
365 had lots of good information about children’s unhealthy habits... we live here in America
366 and sometimes we think that in Brazil things are the same way when we [parents] were
367 kids, but things have changed... it’s the same as here in America...kids not being active,
368 a lot of use of electronics ...” Mother #11, 2 children (6- and 4-years old)

369 “Sometimes on Bem Estar [“Well Being”- Brazilian TV show] they have interviews and
370 talk about children’s health. So, I hear the information and then I talk with friends, other
371 moms, you know, asking if they heard, if they know... we [moms] talk about all sorts of
372 things regarding our children amongst ourselves... and we are always learning from each
373 other...” Mother #34, 2 children (9- and 5-years old)

374 *Public health campaigns*

375 A few mothers mentioned obtaining information about PA and ST from public health
376 campaigns on TV, radio, billboards, etc. and that these campaigns were informative, and
377 increased their awareness and knowledge about the importance of these behaviors for young
378 children, which in turn led to their seeking additional information on these topics.

379 “You hear about children’s health everywhere... they have a lot of information on
380 programs... you even see it in billboards on the road. Here [US] there is a big concern
381 about childhood obesity. Everywhere you turn you find information about it...” Mother
382 #35, 3 children (12-, 9- and 4-years old)

383 *Community-based programs and health-related research*

Brazilian mothers information sources physical activity

A couple of mothers mentioned that community-based programs and health-related research offered by faith-based organizations and at other Brazilian community events as being sporadic sources of information for families.

“...in community events sometimes we [moms] hear about childhood obesity –nutrition, physical activity, and too much use of electronics by kids...a lot of the community health fairs have information on children’s health, and a lot about child obesity ...” Mother #22, 2 children (6- and 4-years old)

“A couple of years ago they had a research study at our Church... I think it was called Viver Bem (Live Well)? They [research staff] came several times to talk to the mothers’ groups. They talked about obesity, and families with children. They ask a lot questions too and then if you wanted you could participate [research]... it was a lot related to preventing obesity in children and they talked about physical activity and electronics and TV too...” Mother #4, 4 children (9-, 7-, 5- and 3-years old)

Theme 3: Mothers use the Internet to seek out information about PA and ST in their native language.

The Internet emerged as the main information source used by mothers to seek out information about PA and ST. Almost three-quarters of the mothers reported accessing the Internet for the range of available information in their native language. Women accessed the Internet via multiple platforms (computers, smartphones, tablets), with smartphones being used most often due to ease and convenience.

“Whenever I have questions, I ask Dr. Google (laughs)! The best thing is Dr. Google speaks my language [Portuguese] (more laughs). My husband sometimes asks me how do

Brazilian mothers information sources physical activity

I know something is right or not? I say, I don't really know, so let's ask Dr. Google!

(laughs)" Mother # 13, 2 children (8- and 4-years old)

Nonetheless, several mothers also mentioned feeling overwhelmed with abundance of information available via the Internet, and that they were not always able to discern between "good" and "bad" information.

"You start looking for information and there's just so much out there that it's easy to get lost...it's hard to know what's good information and what's not...I like that one can find out about anything in the Internet, but when it's health I think one needs to be more careful..." Mother # 28, 2 children (7- and 3-years old)

As mentioned previously (see theme 2 – health care professionals), several mothers reported validating information that they obtained from the Internet with their children's pediatrician.

"Whenever the doctor mentions something about screen time or physical activity during a health visit I take the opportunity to clarify any questions I might have. You know, there's just so much information out there. I like to hear what is the doctor's [pediatrician] opinion, so I ask..." Mother #7, 1 child (4-years old)

DISCUSSION

Parents play a unique and central role in promoting their children's early development of healthy PA and ST behaviors [13-24], and it is important to consider how parents access information related to these behaviors. Therefore, the current study explored how Brazilian immigrant mothers living in the US obtain information about PA and ST behaviors for their

Brazilian mothers information sources physical activity

preschool-age children. This information is needed due to the dearth of research on how low-income immigrant mothers obtain information about PA and ST behaviors for their young children.

Mothers in this study reported that they did not initially seek out information about PA and ST for their preschool-age children, but that they received unsolicited information from multiple sources (e.g., health care professionals, social network of Brazilian friends and family, Brazilian media, etc.) that prompted them to seek out additional information about these behaviors. Most of the Brazilian immigrant mothers participating in this study did not perceive their preschool-aged children PA level as being problematic because their were active and healthy. However, almost all mothers spoke of excessive ST as being a concern for their preschool-aged children, but also voiced an acceptance of ST time being part of their preschool-aged children's lives.

Routine encounters with pediatricians and WIC staff were identified as important sources of unsolicited information about PA and ST behaviors for mothers in the current study. Similar to previous research [44-46], study findings suggest that routine well-child visits increased mothers' awareness of the importance of early PA and ST behaviors for their children's health and well being and this realization motivated mothers to seek out additional information from other sources [44-46]. Study findings also showed that mothers valued information provided by their child's pediatrician and WIC staff, and that many took advantage of routine health encounters with their child's pediatrician to corroborate information obtained from other sources. This finding concurs with evidence documenting that health care professionals play a central role in guiding consumers to quality online health information [47,48]. Given the value mothers placed on the unsolicited and solicited advice they receive from their pediatricians and WIC

Brazilian mothers information sources physical activity

staff, interventions should consider involving these health care professionals possibly through including endorsement (e.g., prescription for PA and maximum ST). In addition, pediatricians and WIC staff could ask mothers during routine visits about their use of the Internet to obtain information and provide some anticipatory guidance on accurate information related to PA and ST behaviors of preschool-aged children.

Consistent with previous research with other ethnic minority groups including Latinos [29, 49], we found that interpersonal communication between social network members comprised of ethnically similar friends and family members was a key source for mothers' obtaining information about PA and ST for their preschool-age children [29]. Prior research shows that shared language, cultural beliefs and values are important factors influencing reliance on interpersonal communication with ethnically similar social networks of friends and family [50,51]. Mothers reported that speaking with other Brazilian mothers in their native language was particularly important and that they valued the information and advice about PA and ST they received. This finding is important and suggests that interventions should consider messages that address the influence from ethnic-like social support networks of Brazilian immigrant mothers [50,51]. Interventions also could be designed to include social network members. For example, participants could be asked to enroll in a program with their best friend or mother, etc.

Results of this study revealed that the Internet is an important source of information for mothers seeking information about PA and ST behaviors for their preschool-aged children [52-55]. This finding is in agreement with previous research with other ethnic immigrant populations [46, 56,57]. Nonetheless, study findings also indicate that several mothers felt overwhelmed with the abundance of available information, and were not always able to discern the credibility of this information. In combination, these findings suggest the potential for further exploration of e-

Brazilian mothers information sources physical activity

health interventions (email, text, etc.) that also include a media literacy component to enable mothers to evaluate information sources to disseminate PA and ST information to Brazilian immigrant families with young children. Furthermore, although more research is needed, study findings suggest that increasing the availability of reliable and valid e-health information in Portuguese language could have a positive influence on increasing awareness and promoting healthy PA and ST behaviors among low-income, minority Brazilian children of immigrant families living in the US. Future research should assess Brazilian immigrant mothers' health literacy levels, as well as mothers' ability to navigate the online environment including discerning trustworthy information sources and evaluating the quality of web sites [58,59].

In this study, TV programs in the mothers' native language (Portuguese) emerged as an important source of information about PA and ST behaviors. Several mothers reported appreciating that these programs offered culturally relevant information that aligned with their beliefs and values. This finding is supported by prior research with other ethnic minority [60,61]. Interventions designed for immigrant Brazilian mothers living in the US should take into account this potential source of information, and as much as possible assess the content of the most popular health-related programs watched by Brazilian families to deliver information that is relevant and culturally attuned with Brazilian culture and values, mothers' health and media literacy levels, and that provides sound, state-of-the-art scientific information to this ethnic group.

Some mothers reported that public health campaigns provided information about PA and ST behaviors. Nevertheless, similar to previous studies [60-62], for some mothers, language barriers [62] appeared to influence their preference for obtaining information from other sources such as the Internet and Brazilian TV shows. Moreover, with the exception of advice received

Brazilian mothers information sources physical activity

from health care professionals, mothers in this study reported a preference for accessing information about PA and ST in their native language, Portuguese. This finding is important and suggests that successful interventions will require attention to mothers' language preference for delivery of information. These findings combined suggest that increased availability of campaigns in Portuguese and partnering with Brazilian ethnic media could be viable strategies to disseminate health information to Brazilian immigrant families living in the US.

A couple mothers also spoke of community-based programs and health-related research as sources of information about PA and ST behaviors. This finding is noteworthy and emphasizes the significance that community-based programs and health-related research can play in raising awareness and educating minority community groups about relevant health-related topics, despite only a couple of mothers mentioned these sources.

The mothers participating in this study had low acculturation levels and identified more closely with Brazilian culture than with US culture. Previous research with other Latino population groups suggests that acculturation level is an important influence on health information seeking-behavior and preferred sources of health information [63,64]. More acculturated individuals are more likely to seek health information and more likely to utilize electronic channels than less acculturated individuals who are more likely to rely on social networks of friends for obtaining health information [63,64]. Our finding regarding Brazilian immigrant mothers' low acculturation levels, combined with results of previous research suggest that successfully interventions targeting Brazilian immigrant parents will require consideration of the target population's acculturation levels.

Finally, study findings suggest the importance of involving health care professionals (pediatricians and WIC staff) in interventions. Health care professionals could endorse healthy

Brazilian mothers information sources physical activity

behaviors (e.g., prescription of PA and limiting ST) as well as information delivered by eHealth interventions, which based on our findings would likely increase both legitimacy and acceptance of such interventions aimed at increasing awareness and educating Brazilian immigrant parents about PA and ST behaviors for their preschool-aged children [65].

LIMITATIONS AND STRENGTHS

Study results should be considered in light of study limitations. Findings are based on a nonrandom and purposeful sample of low-income, Brazilian-born immigrant mothers in two MA communities, which limits generalizability. There is possibility of selection bias as mothers with a heightened interest in or awareness of the importance of child health behaviors may have been more likely to participate in the study. Moreover, the use of snowball sampling to recruit participants might have resulted in the recruitment of study participants who share similar beliefs, attitudes, and behaviors related to PA and ST. Thus, further research is needed to increase generalizability and to explore whether results apply to a broader group of Brazilian immigrants. In addition, this study did not objectively assess mothers' PA and ST behaviors. This is a limitation given that evidence suggests that parent's PA and ST behaviors influence their children's behaviors. Finally, the present study included only mothers and this is a limitation given increasingly evidence suggesting the importance of including both parents in child health promotion and obesity prevention research and interventions [66-68]. Future research can address these limitations by exploring information-seeking behaviors and sources of information used by low-income, minority mothers and fathers from other communities across the U. S., selecting a larger sample size, and employing multiple data collection methods, including both qualitative and quantitative methods, and objectively assessing parents' and children's PA and ST behaviors.

Brazilian mothers information sources physical activity

CONCLUSIONS

Evidence suggests that parents need to be aware of the importance of early healthy behaviors and have access to accurate information that they easily understand so they can implement healthy practices and routines for their young children. Study results indicate that despite mothers’ reporting of widespread use of the Internet to obtain information in their native language, routine health care visits with pediatricians emerged as an important source of information about PA and ST and mothers valued advice given by their child’s pediatricians. Furthermore, mothers viewed WIC program staff as providing important information about PA and ST. Given the value Brazilian immigrant mothers placed on the advice of their pediatricians and WIC professionals, interventions should consider involving these health care professionals possibly through including endorsement (e.g., prescription for PA and maximum ST). Furthermore, given this study finding of mothers’ reporting of widespread use of the Internet to obtain information in their native language, culturally and linguistically suitable eHealth interventions may be viable ways to provide accurate and easily understood information about PA and ST to Brazilian immigrant families with preschool-aged children living in the US. Finally, more research is needed to ensure Brazilian immigrant mothers’ health and media literacy including their ability to navigate the online environment and to discern the accuracy and quality of information from various web sites.

ABBREVIATIONS

AAP: American Academy of Pediatrics; FGD: Focus Group Discussion; MA: Massachusetts; NASPE: National Association for Sport and Physical Education; PA: physical activity; SASH: Short Acculturation Scale for Hispanics; SNAP: Supplemental Nutrition Assistance Program; ST: screen time; US: United States; WIC: Women, Infants and Children.

Brazilian mothers information sources physical activity

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Contributorship: ACL participated in study design, data collection, data analysis, and manuscript preparation and review. CAMA participated in qualitative data analysis, manuscript preparation, and manuscript review. MMTM participated in manuscript preparation and review. GDA in data collection and manuscript preparation and manuscript review. MLG participated in study design, manuscript preparation, and manuscript review.

Ethical Standards Disclosure: This study was approved by the Institutional Review Board for the Protection of Human Subjects at the University of Massachusetts Boston. Written and oral informed consent was obtained from all participants.

Data Sharing: Data and all other materials for this study are kept at the Department of Exercise and Health Sciences, University of Massachusetts Boston. The datasets generated during and/or analyzed during the current study are not publicly available due the terms of consent to which participants agreed to, but are available from the corresponding author on reasonable request.

REFERENCES

- Hernandez, D. J., Denton, N. A., & McCartney, S. E. (2008). Children in immigrant families: Looking to America's future. Social Policy Report, 22(3). Retrieved from <http://www.childtrends.org/?indicators=immigrant-children>
- Lima, A., & Siqueira, C. E. (2007). Brazilians in the U.S. and Massachusetts: A demographic and economic profile. *Gastón Institute Publications*, Paper 50. Retrieved from: http://scholarworks.umb.edu/gaston_pubs/50/
- Jouët-Pastré, Clémence, and Leticia J. Braga. Becoming Brazuca: Brazilian Immigration to the United States. Cambridge, Mass.: David Rockefeller Center for Latin American Studies, Harvard University Press, 2008.
- Goza, F. (1994) Brazilian immigration to North America. *International Migration Review*, 28(1), 136-152.
- Tovar A, Hennessy E, Must A, Hughes SO, Gute DM, Sliwa S, Boulos RJ, Vikre EK, Kamins CL, Tofuri K, Pirie A, Economos CD. (2013). Feeding styles and evening family meals among recent immigrants. *Int J Behav Nutr Phys Act.*, 10:84. doi:10.1186/1479-5868-10-84.
- O'Dwyer, M. V., Fairclough, S. J., Knowles, Z., & Stratton, G. (2012). Effect of a family focused active play intervention on sedentary time and physical activity in preschool children. *International Journal of Behavioral Nutrition and Physical Activity*, 9(1), 1-13.
- Chuang R. J., Sharman S., Skala, K., & Evans, A. (2013). Ethnic differences in the home environment and physical activity behaviors among low-income, minority preschoolers in Texas. *American Journal of Health Promotion*, 27(4), 270-278. doi:10.4278/ajhp.110427-QUAN-171

Brazilian mothers information sources physical activity

8. National Association for Sport and Physical Education (NASPE). (2009). *Active start: A statement of physical activity guidelines for children from birth to age 5* (2nd ed.). Sewickley, PA: American Alliance for Health, Physical Education, Recreation, and Dance.

9. Council on Communications and Media. Media and Young Minds. (2016). *Pediatrics*, 138:e20162591.

10. Commonwealth of Australia, Department of Health and Ageing. (2010). *Move and play every day: National physical activity recommendations for children 0 to 5 years*. Retrieved from [http://www.health.gov.au/internet/main/publishing.nsf/content/9D831D9E6713F92ACA257BF0001F5218/\\$File/0-5yrACTIVE_Brochure_FA%20SCREEN.pdf](http://www.health.gov.au/internet/main/publishing.nsf/content/9D831D9E6713F92ACA257BF0001F5218/$File/0-5yrACTIVE_Brochure_FA%20SCREEN.pdf)

11. Tremblay, M. S., Leblanc, A. G., Carson, V., Choquette, L., Connor Gorber, S., Dillman, C., ... Timmons, B. W. (2012). Canadian physical activity guidelines for the early years (aged 0 to 4 years). *Applied Physiology, Nutrition, and Metabolism*, 37(2), 370-391.

12. Lindsay, A. C., Sussner, K. M., Kim, J., & Gortmaker, S. (2006). The role of parents in preventing childhood obesity. *Future of Children*, 16(1), 169-186.

13. O'Connor, T. M., Cerin, E., Lee, R. E., Parker, N., Chen, T. A., Hughes, S. O., ... Baranowski, T. (2014). Environmental and cultural correlates of physical activity parenting practices among Latino parents with preschool-aged children: Niños activos. *BMC Public Health*, 14, 707. doi:10.1186/1471-2458-14-707

14. Byrd-Bredbenner C, Martin-Biggers J, Povis GA, Worobey J, Hongu N, Quick V. (2018). Promoting healthy home environments and lifestyles in families with preschool children: HomeStyles, a randomized controlled trial. *Contemp Clin Trials.*, 64:139-151. doi: 10.1016/j.cct.2017.10.012.

15. O'Connor, T. M., Cerin, E., Hughes, S. O., Robles, J., Thompson, D., Baranowski, T., ... Shewchuk, R. M. (2013). What Hispanic parents do to encourage and discourage 3-4 year old children to be active: A qualitative study using nominal group technique. *International Journal of Behavioral Nutrition and Physical Activity*, 10, 93. doi:10.1186/1479-5868-10-93

16. O'Connor, T. M., Chen, T. A., Baranowski, J., Thompson, D., & Baranowski, T. (2013). Physical activity and screen-media-related parenting practices have different associations with children's objectively measured physical activity. *Childhood Obesity*, 9(5), 446-453.

17. Cespedes EM, McDonald J, Haines J, Bottino CJ, Schmidt ME, Taveras EM. (2013). Obesity-related behaviors of US- and non-US-born parents and children in low-income households. *J Dev Behav Pediatr.*, 34(8):541-8. doi: 10.1097/DBP.0b013e3182a509fb.

18. Downing KL, Hinkley T, Hesketh KD. (2015). Associations of Parental Rules and Socioeconomic Position With Preschool Children's Sedentary Behaviour and Screen Time. *J Phys Act Health.*, 12(4):515-21. doi: 10.1123/jpah.2013-0427. Epub 2014 Aug 22.

19. Pearson N, Salmon J, Crawford D, Campbell K, Timperio A. (2011). Are parental concerns for child TV viewing associated with child TV viewing and the home sedentary environment? *Int J Behav Nutr Phys Act.*, 27;8:102. doi: 10.1186/1479-5868-8-102.

20. Jago R, Sebire SJ, Edwards MJ, Thompson JL. (2013). Parental TV viewing, parental self-efficacy, media equipment and TV viewing among preschool children. *Eur J Pediatr.*, 172(11):1543-5. doi: 10.1007/s00431-013-2077-5.

21. Jago R, Stamatakis E, Gama A, Carvalhal IM, Nogueira H, Rosado V, Padez C. (2012). Parent and child screen-viewing time and home media environment. *Am J Prev Med.*, 43(2):150-8. doi: 10.1016/j.amepre.2012.04.012.

Brazilian mothers information sources physical activity

22. Zecevic, C. A., Tremblay, L., Lovsin, T., & Michel, L. (2010). Parental influence on young children's physical activity. *International Journal of Pediatrics*, 468-526. doi:10.1155/2010/468526.
23. Lindsay AC, Greaney ML, Wallington SF, Mesa T, Salas CF. (2017). A review of early influences on physical activity and sedentary behaviors of preschool-age children in high-income countries. *J Spec Pediatr Nurs*. 22(3). doi: 10.1111/jspn.12182.
24. Smith BJ, Grunseit A, Hardy LL, King L, Wolfenden L, Milat A. (2010). Parental influences on child physical activity and screen viewing time: a population based study. *BMC Public Health*, 10:593. doi: 10.1186/1471-2458-10-593.
25. Finkelstein DM, Petersen DM, Schottenfeld LS. (2017). Promoting Children's Physical Activity in Low-Income Communities in Colorado: What Are the Barriers and Opportunities? *Prev Chronic Dis*. 14:E134. doi: 10.5888/pcd14.170111.
26. Hammersley ML, Jones RA, Okely AD. (2017). Time2bHealthy - An online childhood obesity prevention program for preschool-aged children: A randomised controlled trial protocol. *Contemp Clin Trials*, 61:73-80. doi: 10.1016/j.cct.2017.07.022.
27. Marsh S, Foley LS, Wilks DC, Maddison R. (2014). Family-based interventions for reducing sedentary time in youth: a systematic review of randomized controlled trials. *Obes Rev*. 15(2):117-33. doi: 10.1111/obr.12105.
28. Stanley RM, Jones RA, Cliff DP, Trost SG, Berthelsen D, Salmon J, Batterham M, Eckermann S, Reilly JJ, Brown N, Mickle KJ, Howard SJ, Hinkley T, Janssen X, Chandler P, Cross P, Gowers F, Okely AD. (2016). Increasing physical activity among young children from disadvantaged communities: study protocol of a group randomised controlled effectiveness trial. *BMC Public Health*, 16(1):1095.
29. Davis RE, Cole SM, McKenney-Shubert SJ, Jones SJ, Peterson KE. (2017). An Exploration of How Mexican American WIC Mothers Obtain Information About Behaviors Associated With Childhood Obesity Risk. *J Nutr Educ Behav*. , 49(3):187-195.e1. doi: 10.1016/j.jneb.2016.10.002.
30. Rooks RN, Wiltshire JC, Elder K, BeLue R, Gary LC. (2012). Health information seeking and use outside of the medical encounter: is it associated with race and ethnicity? *Soc Sci Med*, 74:176-184
31. Brown A, Lopez MH. Public libraries and Hispanics: immigrant Hispanics use libraries less, but those who do appreciate them the most Pew Research Center, Washington, DC (2015), pp. 1-38
32. Powe BD. (2015). Health Information Seeking Among Rural African Americans, Caucasians, and Hispanics: It Is Built, Did They Come? *Nurs Clin North Am*, 50(3):531-43. doi: 10.1016/j.cnur.2015.05.007.
33. Lindsay, A. C., Wallington, S. F., Greaney, M. L., Hasselman, M. H., Machado, M. M., Mezzavilla, R. S., & Detro, B. M. (2017). Sociocultural and environmental influences on Brazilian immigrant mothers' beliefs and practices related to child feeding and weight status. *Maternal and Child Health Journal*, 21(5), 1085–1094. doi:10.1007/s10995-016-2207-6
34. Lindsay, A. C., de Oliveira, M. G., Wallington, S. F., Greaney, M. L., Machado, M. M., Freitag Pagliuca, L. M., & Arruda, C. A. (2016). Access and utilization of healthcare services in Massachusetts, United States: a qualitative study of the perspectives and experiences of Brazilian-born immigrant women. *BMC Health Services Research*, 16, 467. doi:10.1186/s12913-016-1723-9

Brazilian mothers information sources physical activity

35. Lindsay, A. C., Wallington, S. F., Greaney, M. L., Hasselman, M. H., Tavares Machado, M. M., & Mezzavilla, R. S. (2016). Brazilian immigrant mothers' beliefs and practices related to infant feeding: A qualitative study. *Journal of Human Lactation*. doi:10.1177/0890334416676267

36. Culley L, Hudson N, Rapport F. (2007). Using focus groups with minority ethnic communities: Researching infertility in British South Asian communities. *Qual Health Res*. 17(1):102-12.

37. Kidd PS, Parshall MB. (2000). Getting the focus and the group: enhancing analytical rigor in focus group research. *Qual Health Res*, 10(3):293-308.

38. Faugier J, Sargeat M. (1997). Sampling hard to reach populations. *Journal of Advanced Nursing*; 26:790-797.

39. Lindsay AC, Arruda CAM, Tavares Machado MM, Greaney ML. (in press) Social Contextual Influences on Sleep and Bedtime Routines Among Preschool-Aged Children of Brazilian Immigrant Families Living in the United States: A Qualitative Study. *Children*.

40. Marin, G., Sabogal, F., Marin, B. V., Otero-Sabogal, R., & Perez-Stable, E. J. (1987). Development of a short acculturation scale for Hispanics. *Hispanic Journal of Behavioral Sciences*, 9(2):183-205.

41. Miles M, Huberman A. (1994). *Qualitative data analysis*. 2nd ed. Thousand Oaks: Sage Publications.

42. Ritchie J, Spencer L, O'Connor W. (2004). Carrying out qualitative analysis. In Ritchie J, Lewis J (eds) *Qualitative research practice*. pp 219-262. London: Sage Publications.

43. Vaismoradi M, Turunen H, Bondas T. (2013). Content analysis and thematic analysis: implications for conducting a qualitative descriptive study. *Nurs Health Sci*. 15(3):398-405. doi:10.1111/nhs.12048

44. Byrne JL, Cameron Wild T, Maximova K, Browne NE, Holt NL, Cave AJ, Martz P, Ellendt C, Ball GD. (2016). A brief eHealth tool delivered in primary care to help parents prevent childhood obesity: a randomized controlled trial. *Pediatr Obes*. doi: 10.1111/ijpo.12200.

45. Wright JA, Whiteley JA, Watson BL, Sheinfeld Gorin SN, Hayman LL. (2017). Tailored communications for obesity prevention in pediatric primary care: a feasibility study. *Health Educ Res*. .doi: 10.1093/her/cyx063.

46. Janz KF, Butner KL, Pate RR. (2013). The role of pediatricians in increasing physical activity in youth. *JAMA Pediatr*. 167(7):595-6. doi: 10.1001/jamapediatrics.2013.2144.

47. Sherwood NE, Levy RL, Langer SL, Senso MM, Crain AL, Hayes MG, Anderson JD, Seburg EM, Jeffery RW. (2013). Healthy Homes/Healthy Kids: a randomized trial of a pediatric primary care-based obesity prevention intervention for at-risk 5-10 year olds. *Contemp Clin Trials*. 36(1):228-43. doi: 10.1016/j.cct.2013.06.017.

48. Chae J, Quick BL. (2015). An examination of the relationship between health information use and health orientation in Korean mothers: focusing on the type of health information. *J Health Commun*., 20(3):275-84. doi: 10.1080/10810730.2014.925016.

49. Walker LO, Mackert MS, Ahn J, Vaughan MW, Sterling BS, Guy S, Hendrickson S. (2017). e-Health and new moms: Contextual factors associated with sources of health information. *Public Health Nurs*. 34(6):561-568. doi: 10.1111/phn.12347.

50. Kind T, Huang ZJ, Farr D, Pomerantz KL. (2005). Internet and computer access and use for health information in an underserved community. *Ambul Pediatr*., 5(2):117-21.

Brazilian mothers information sources physical activity

51. Park E, Kim H, Steinhoff A. Health-Related Internet Use by Informal Caregivers of Children and Adolescents: An Integrative Literature Review. *J Med Internet Res*. 2016 Mar 3;18(3):e57. doi: 10.2196/jmir.4124.
52. Khoo K, Bolt P, Babl FE, Jury S, Goldman RD. (2008). Health information seeking by parents in the Internet age. *J Paediatr Child Health*, 44(7-8):419-23. doi: 10.1111/j.1440-1754.2008.01322.x.
53. Rooks RN, Wiltshire JC, Elder K, BeLue R, Gary LC. (2012). Health information seeking and use outside of the medical encounter: is it associated with race and ethnicity? *Soc Sci Med*. 74: 176-184.
54. Richardson A, Allen JA, Xiao H, Vallone D. (2012). Effects of race/ethnicity and socioeconomic status on health information-seeking, confidence, and trust. *J Health Care Poor Underserved*. 23:1477-1493.
55. Clayman ML, Manganello JA, Viswanath K, Hesse BW, Arora NK. (2010). Providing health messages to Hispanics/Latinos: understanding the importance of language, trust in health information sources, and media use. *J Health Commun*, 15:252-263.
56. Geana MV, Kimminau KS, Greiner KA. Sources of health information in a multiethnic, underserved, urban community: does ethnicity matter? *J Health Commun*. 2011;16:583-594.
57. Standiford CJ, Nolan E, Harris M, Bernstein SJ. Improving the provision of language services at an academic medical center: ensuring high-quality health communication for limited-English-proficient patients. *Acad Med*. 2009 Dec;84(12):1693-7. doi: 10.1097/ACM.0b013e3181bf4659.
58. Mackert M, Kahlor L, Tyler D, Gustafson J. (2009). Designing e-health interventions for low-health-literate culturally diverse parents: addressing the obesity epidemic. *Telemed J E Health*, 15(7):672-7. doi: 10.1089/tmj.2009.0012.
59. Hall CM, Bierman KL. (2015). Technology-assisted Interventions for Parents of Young Children: Emerging Practices, Current Research, and Future Directions. *Early Child Res Q*, 33:21-32.
60. Sherwood NE, JaKa MM, Crain AL, Martinson BC, Hayes MG, Anderson JD. (2015). Pediatric Primary Care-Based Obesity Prevention for Parents of Preschool Children: A Pilot Study. *Child Obes*. 11(6):674-82. doi: 10.1089/chi.2015.0009. Epub 2015 Oct 19.
61. Gorin AA, Wiley J, Ohannessian CM, Hernandez D, Grant A, Cloutier MM. (2014). Steps to Growing Up Healthy: a pediatric primary care based obesity prevention program for young children. *BMC Public Health*, 14:72. doi: 10.1186/1471-2458-14-72.
62. Neshteruk CD, Nezami BT, Nino-Tapias G, Davison KK, Ward DS. (2017). The influence of fathers on children's physical activity: A review of the literature from 2009 to 2015. *Prev Med*, 102:12-19. doi: 10.1016/j.ypmed.2017.06.027.
63. Hillyer GC, Schmitt KM, Lizardo M, Reyes A, Bazan M, Alvarez MC, Sandoval R, Abdul K, Orjuela MA. (2017). Electronic Communication Channel Use and Health Information Source Preferences Among Latinos in Northern Manhattan. *J Community Health*. 42(2):349-357. doi: 10.1007/s10900-016-0261-z.
64. Roncancio AM, Berenson AB, Rahman M. (2012). Health locus of control, acculturation, and health-related Internet use among Latinas. *J Health Commun*, 17(6):631-40. doi: 10.1080/10810730.2011.635767.
65. Lindsay AC, Wallington SF, Muñoz MA, Greaney ML. (2018). A qualitative study conducted in the USA exploring Latino fathers' beliefs, attitudes and practices related to their

Brazilian mothers information sources physical activity

young children's eating, physical activity and sedentary behaviours. *Public Health Nutr* 21(2):403-415. doi: 10.1017/S1368980017002579.

66. Cloutier MM, Wiley J, Huedo-Medina T, Ohannessian CM, Grant A, Hernandez D, Gorin AA. (2015). Outcomes from a Pediatric Primary Care Weight Management Program: Steps to Growing Up Healthy. *J Pediatr.*, 167(2):372-7.e1. doi: 10.1016/j.jpeds.2015.05.028. Epub 2015 Jun 12.

67. McSweeney L, Araújo-Soares V, Rapley T, Adamson A. (2017). A feasibility study with process evaluation of a preschool intervention to improve child and family lifestyle behaviours. *BMC Public Health*, 17(1):248. doi: 10.1186/s12889-017-4167-1.

68. Davis AM, Daldalian MC, Mayfield CA, Dean K, Black WR, Sampilo ML, Gonzalez-Mijares M, Suminski R. (2013). Outcomes from an urban pediatric obesity program targeting minority youth: the Healthy Hawks program. *Child Obes.*, 9(6):492-500. doi: 10.1089/chi.2013.0053.

COREQ (Consolidated criteria for REporting Qualitative research) Checklist

A checklist of items that should be included in reports of qualitative research. You must report the page number in your manuscript where you consider each of the items listed in this checklist. If you have not included this information, either revise your manuscript accordingly before submitting or note N/A.

Topic	Item No.	Guide Questions/Description	Reported on Page No.
Domain 1: Research team and reflexivity			
<i>Personal characteristics</i>			
Interviewer/facilitator	1	Which author/s conducted the interview or focus group?	
Credentials	2	What were the researcher's credentials? E.g. PhD, MD	
Occupation	3	What was their occupation at the time of the study?	
Gender	4	Was the researcher male or female?	
Experience and training	5	What experience or training did the researcher have?	
<i>Relationship with participants</i>			
Relationship established	6	Was a relationship established prior to study commencement?	
Participant knowledge of the interviewer	7	What did the participants know about the researcher? e.g. personal goals, reasons for doing the research	
Interviewer characteristics	8	What characteristics were reported about the interviewer/facilitator? e.g. Bias, assumptions, reasons and interests in the research topic	
Domain 2: Study design			
<i>Theoretical framework</i>			
Methodological orientation and Theory	9	What methodological orientation was stated to underpin the study? e.g. grounded theory, discourse analysis, ethnography, phenomenology, content analysis	
<i>Participant selection</i>			
Sampling	10	How were participants selected? e.g. purposive, convenience, consecutive, snowball	
Method of approach	11	How were participants approached? e.g. face-to-face, telephone, mail, email	
Sample size	12	How many participants were in the study?	
Non-participation	13	How many people refused to participate or dropped out? Reasons?	
<i>Setting</i>			
Setting of data collection	14	Where was the data collected? e.g. home, clinic, workplace	
Presence of non-participants	15	Was anyone else present besides the participants and researchers?	
Description of sample	16	What are the important characteristics of the sample? e.g. demographic data, date	
<i>Data collection</i>			
Interview guide	17	Were questions, prompts, guides provided by the authors? Was it pilot tested?	
Repeat interviews	18	Were repeat interviews carried out? If yes, how many?	
Audio/visual recording	19	Did the research use audio or visual recording to collect the data?	
Field notes	20	Were field notes made during and/or after the interview or focus group?	
Duration	21	What was the duration of the interviews or focus group?	
Data saturation	22	Was data saturation discussed?	
Transcripts returned	23	Were transcripts returned to participants for comment and/or	

Topic	Item No.	Guide Questions/Description	Reported on Page No.
		correction?	
Domain 3: analysis and findings			
<i>Data analysis</i>			
Number of data coders	24	How many data coders coded the data?	
Description of the coding tree	25	Did authors provide a description of the coding tree?	
Derivation of themes	26	Were themes identified in advance or derived from the data?	
Software	27	What software, if applicable, was used to manage the data?	
Participant checking	28	Did participants provide feedback on the findings?	
<i>Reporting</i>			
Quotations presented	29	Were participant quotations presented to illustrate the themes/findings? Was each quotation identified? e.g. participant number	
Data and findings consistent	30	Was there consistency between the data presented and the findings?	
Clarity of major themes	31	Were major themes clearly presented in the findings?	
Clarity of minor themes	32	Is there a description of diverse cases or discussion of minor themes?	

Developed from: Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *International Journal for Quality in Health Care*. 2007. Volume 19, Number 6: pp. 349 – 357

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