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## Modeling the Influence of Early Skin-to-Skin Contact on Exclusive Breastfeeding in a Sample of Hispanic Immigrant Women

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### Abstract

Using data from a longitudinal study of breastfeeding in Hispanics, this study evaluated the influence of early skin-to-skin contact (SSC) on initiation and sustained exclusive breastfeeding (EBF) at 1 month post-partum. Two-thirds of the women in the sample participated in early SSC. At discharge, over half of the women were EBF; this proportion decreased to one-third at 1 month postpartum. Controlling for demographic and clinical variables in the model, participation in early SSC was associated with a greater than sevenfold increase in the odds of EBF at discharge ( $p = .005$ ) but was not predictive of EBF at 1 month post-discharge ( $p = .7$ ). Younger maternal age and increased prenatal infant feeding intention were associated with an increased likelihood of EBF across both timepoints. Promoting early SSC may help with initiation of EBF, while further breastfeeding support may be needed to maintain EBF following discharge for this vulnerable population.

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Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

## Keywords

Exclusive Breastfeeding; Hispanics; Immigrants; Skin-to-Skin Contact; Kentucky

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## Introduction

Exclusive breastfeeding (EBF) is the most efficient form of infant feeding and nutrition and is defined as exclusive infant feeding with breast milk without any additional food or drink [1]. The World Health Organization/UNICEF, the American Academy of Pediatrics (AAP), and the United States Breastfeeding Committee (USBC) recommend EBF for a minimum of 6 months post-birth, followed by continued breastfeeding for a minimum of one year as complementary foods are introduced [1–3].

Breastfeeding compared with artificial infant feeding offers protection against several metabolic and physiological changes later in life, in particular, obesity and related medical complications [2, 4, 5]. Additionally, breastfeeding in infancy is associated with lower adult body mass index (BMI) and decreased cardiovascular disease risk [6]. An examination of disparities in early childhood obesity among ethnic groups shows that Hispanic infants/children have higher rates of overweight and obesity than children/infants of other races/ethnicities. According to the most recent National Health and Nutrition Examination Survey (2014), the prevalence of high weight for recumbent length (95<sup>th</sup> percentile) among infant and toddlers from birth to 2 years was 6.6% in Whites, 8.4% in Blacks, and 9.4% in Hispanics [7]. These data suggest that ethnic disparities in childhood obesity prevalence have their origins in the earliest stages of life.

### Breastfeeding Practices among Hispanics in the U.S.

Hispanic mothers in the U.S. are less likely to practice EBF, more likely to initiate early introduction of solid foods, and more likely to perceive chubbier infants as healthy [8]. More Hispanic mothers supplement with formula in the first 2 days of life, compared with Black and White U.S. mothers (Hispanic 33%; Black 28%; White 22%) [9]. The reason behind the introduction of formula is related to the woman's fatalistic attitude about sufficient milk supply [10]. The evidence shows that for some Hispanic women, mixed feeding is considered acceptable, even desirable, and not harmful [10–12]. The cultural logic that construct formula feeding as an acceptable practice among Hispanics appears to arise from early supplementation with formula and the misperception that formula is a healthy solution to breastfeeding difficulties [10, 12, 13]. The early introduction of formula produces a negative effect on the response of milk production that leads to decrease rates of duration and exclusivity of breastfeeding [14]. Additionally, the introduction of formula or complementary food in breastfed Hispanic infants produces an overfeeding problem that leads to childhood obesity [8].

### Psychophysiology of Early Skin-to-Skin Contact

Throughout the United States, birthing hospitals are promoting initiation of breastfeeding by routinely practicing early skin-to-skin contact (SSC) in all uncomplicated vaginal and/or cesarean section delivery, unless the mother explicitly refuses [15]. SSC provides the

condition to mother/infant dyads to remain in an unhurried and unlimited period of skin contact. The first hours after birth are crucial for mother and infant in terms of their wellbeing, the opportunity to bond with each other, and the first breastfeed, which are all promoted by early SSC [15, 16].

Early SSC is also known as birth kangaroo care and is described as the placement of the naked infant on the mother's bare chest immediately after birth until completion of the first feeding [15, 17]. The infant may be dried and procedures such as Apgar scoring and initial physical assessment may be performed while the infant is on the mother's chest. Many advantages have been described as resulting from SSC including improve maternal bonding/attachment [18], reduced depressive symptoms and stress in the postpartum period [19], enhanced analgesic effect during neonatal procedures [20], and reduced hypothermia in neonates [21]. Moreover, a review of literature addresses the effect of SSC on the physiologic stability in the preterm and term infant including heart rate, respiratory rate, oxygen saturation, temperature, among others [16].

A clear benefit of early SSC is its association with breastfeeding [17, 18, 22]. Healthy, full term infants employ a *species-specific* set of innate behaviors immediately following delivery when placed on SSC with the mother [23, 24]. They localize the nipple by smell and have a heightened response to odor cues in the first few hours after birth [23, 25]. Infants who are allowed uninterrupted SSC immediately after birth and who self-attach to the mother's nipple may continue to nurse more effectively [18]. A meta-analysis of randomized controlled trials on SSC reported a significant positive effect of early SSC on breastfeeding at one to four months post birth [18]. Early SSC was significantly associated with improved rates of initiation and breastfeeding at discharge from hospital stay [26]. One group of researchers reported the association of SSC with EBF--the longer the period of early SSC the greater the likelihood of EBF during the maternity hospitalization [27].

Considering that Hispanic women have the greater rates of supplementing with formula during hospital stay [9], the primary aim of this report was to evaluate if practicing early SSC positively influences the initiation and sustaining at 1-month of EBF in a group of Hispanic immigrant women that gave birth in a birthing hospital facility in central Kentucky. We posed the following research questions:

1. What are the demographic and clinical factors (i.e. mode of delivery, infant extended stay in nursery) associated with practicing early SSC among Hispanic mothers in central Kentucky?
2. What is the influence of early SSC in initiation and sustained EBF at 1-month postpartum among Hispanic mothers in central Kentucky?

## Methods

Data for this investigation were from a longitudinal study that was conducted to assess factors influencing breastfeeding initiation and duration [28]. The study included a convenience sample of 100 Hispanic women in central Kentucky that were recruited during pregnancy. This report included only participants with a full-term infants ( $n = 97$ ). Three

mothers with pre-term infants were excluded. All participants were first-generation Hispanic immigrants (92% Mexico; 4% Guatemala; 3% Honduras; and 1% Peru).

Inclusion criteria included: 1) self-identified as Hispanic; 2) age 16 years or older; 3) pregnancy at or beyond 20 weeks of gestation; 4) an apparently healthy pregnancy; 5) planning to give birth in a local birthing hospital where early SSC was routinely offered; and 6) planning to remain in central Kentucky for at least 1-month after birth of the infant. Participants under the age of 18 were included only if they were emancipated [29].

## Measures

Data were collected during a baseline prenatal interview, from hospital stay medical records, and during 1-month post-discharge interview. An attrition of 13% (n = 13) occurred at 1-month follow-up interview.

**Demographic and clinical characteristics**—Age, education and living arrangements were assessed at the prenatal interview. Mode of delivery (vaginal or cesarean), and whether the infant was separated from the mother with extended stay (more than 2 hours) at newborn nursery (NBN; Yes vs. No), were collected via chart review.

**Practicing skin-to-skin contact**—The birthing hospital is routinely practicing early SSC to all uncomplicated vaginal and/or cesarean section delivery, unless the mother explicitly refuses. We collected data from the chart to assess if the woman has participated in early SSC (Yes vs. No). Data about women refused to get SSC or the amount of time that SSC was practiced were not found in the charts.

**Prenatal infant feeding intention**—The Infant Feeding Intention scale (IFI) [30] version which has been validated in Spanish [31] was used during the baseline interview to assess the prenatal infant feeding plan the mother had for her infant. This 5-item instrument included two items that probed the strength of intentions to initiate breastfeeding and three items that assessed the strength of intentions to sustain exclusively breastfeeding through time. Responses to each item were on a 5-point Likert scale ranging from 0 (very much disagree) to 4 (very much agree). Total IFI score is calculated by averaging the score for the first two items and summing this average with the scores for items 3–5 [30]. Possible scores range from 0 (no intentions to breastfeed) to 16 (very strong intentions to EBF until 6 months). Cronbach's alpha coefficient reliability for this study was .76.

**Infant feeding**—Infant feeding status at discharge was determined via medical chart review from reports in the infant's and mother's charts such as notes from the physician, lactation consultant, nurse or other clinician. Discharge from hospital stay was based on standard care procedures at the study site:  $\pm 48$  hours for vaginal delivery and  $\pm 72$  hours for cesarean section. At 1 month postpartum, during the face-to-face interview, mothers were asked “How do you feed your baby?” Mothers who indicated they were only breastfeeding were also asked “Does your baby receive water, juice or any solids?” as a confirmation of cumulative EBF for the first month.

## Procedure

The Medical Institutional Review Board of the University of Kentucky approved the study. To assure privacy and protect participants' sensitive information on immigration status and/or assuage about sharing their personal information, a Certificate of Confidentiality was obtained from the National Institutes of Health. Participants were recruited from a local primary health care clinic and through referral from the County Health Department. Women were approached in the waiting area of the prenatal clinic by bilingual/bicultural trained research personnel who explained the objectives of the study, checked for eligibility, and invited them to participate in the research study. Women who agreed to participate and met the inclusion criteria signed a written informed consent and the Health Insurance Portability and Accountability Act (HIPAA) forms. Participants were interviewed in a private room at the clinic following the completion of their prenatal care visit, or if they preferred, were interviewed at their home. The recruitment, interview, and informed consent documents were administered in Spanish. Participants were compensated with a \$25 gift card during the baseline interview and a baby gift package valued \$30 in the 1-month interview.

## Data Analysis

Descriptive statistics, including means and standard deviations or frequency distributions, were used to summarize the demographic and clinical characteristics of the participants. Chi-square tests of association and independent samples t-tests were used to evaluate and summarize bivariate associations between demographic and clinical characteristics and participation in early SSC. To assess the relationship between SSC and EBF over time, a generalized estimating equations (GEE) model for binary outcomes was used [32]. This repeated measures model determined whether EBF status at discharge and 1 month post-discharge were associated with demographic and personal characteristics, including SSC. The GEE model outcome was EBF status (Yes vs. No). Covariates in the model included age, education (High school or below vs. some post-secondary education), living with partner (Yes vs. No), type of delivery (vaginal vs. cesarean), prenatal IFI score, and early SSC (Yes vs. No). Time (with possible values of discharge or 1 month postpartum) was also contained in the GEE so that it would be possible to include EBF status at both timepoints in the same model. The interaction between *time* and early SSC was included as well; interactions between *time* and other model covariates were not retained since they were not significant. Variance inflation factors were estimated to assess whether multicollinearity was present. All analyses were conducted using SAS version 9.3, with an alpha level of .05 throughout.

## Results

Descriptive statistics are displayed in Table 1. Participants' mean age was 27.8 years ( $SD = 5.3$ ) and the majority of the mothers were high school graduates or below (90%). More than three-quarters lived with their partner (83%). Most of the women already had children (91%). Cesarean was the mode of delivery in over a quarter of deliveries (27%). Prenatal infant feeding intention scores had a mean of 11.9 (potential score range 0-16). Two-thirds of the mother/infant dyads practiced early SSC. One-fifth ( $n = 19$ ) of infants did not practice early SSC because were separated from their mother with extended stay in the NBN ( $> 2$



hours) with reasons including cesarean section ( $n = 12$ ), other mother condition ( $n = 2$ ), newborn respiratory distress ( $n = 4$ ), and infant hypoglycemia ( $n = 1$ ) (data not shown in tables). Reasons for not practicing SSC were not documented in some of the medical infant charts ( $n = 13$ ). At discharge, over half of the women were EBF (53%), and approximately one-third (39%) were EBF at 1-month post discharge (Figure 1). Given the small number of mothers that were practicing formula-only feeding, and the goal of EBF over time of this report, the outcomes was split into those who were practicing EBF and those who were using at least some formula. No report of infants using water or other complementary food was described for mothers in this sample.

Results of the bivariate analyses examining the association between participation in early SSC and demographic and clinical characteristics are also displayed in Table 1. Mothers who had vaginal deliveries were more likely to practice early SSC (86% vs. 15% of those with cesarean;  $p < .001$ ) and similarly those who were not separated from their infant for an extended stay in the NBN were more likely to participate in early SSC (78% vs. 21%;  $p < .001$ ). A higher proportion of those who were EBF at discharge practiced early SSC, compared to those who were formula or combination feeding at discharge (86% vs. 46%;  $p < .001$ ). Because mode of delivery and infant extended stay at NBN were highly correlated ( $\phi = -0.46$ ,  $p < .001$ ), mode of delivery alone was retained for the multivariate analysis as a way to prevent the distortion of regression parameter estimates that arises from multicollinearity. In the bivariate analysis, early SSC was unrelated to maternal age, education, living situation, or prenatal infant feeding intention.

Results from the longitudinal analysis examining the effect of early SSC on likelihood of EBF over time are displayed in Table 2. The interaction between participation in early SSC and time (discharge, 1-month postpartum) was significant ( $p = .018$ ); hence the influence of early SSC on likelihood of EBF differed over time. Other variables in the model did not exhibit significant interactions with time, suggesting the relationship between a given predictor and the EBF status did not vary much between discharge and 1-month postpartum. Because of this, the remaining covariate interactions with time were removed from the final model. Controlling for all other variables in the model, participation in early SSC was associated with greater than 7-fold increase in the odds of EBF at discharge (odds ratio [OR] = 7.4;  $p = .005$ ) but was not predictive of EBF at 1-month post discharge ( $p = .7$ ). Younger maternal age (OR = 0.93;  $p = .045$ ) and increased prenatal infant feeding intention (OR = 1.17;  $p = .003$ ) were associated with an increased likelihood of EBF across both timepoints. Education, living arrangements and mode of delivery were not associated with EBF in the multivariate model. All variance inflation factors were less than 1.8, suggesting multicollinearity was not an issue in this model.

We carried out additional analyses to explore reasons women stopped EBF and found that cessation was associated with perception of low breast-milk production (62%), experiencing pain with breastfeeding (23%), returning to work (9%), and pediatrician recommendation (6%).



## Discussion

Our findings show that two-third of the group of Hispanic immigrant women practiced early SSC. The most significant factor influencing the likelihood of practicing early SSC was mode of delivery; while the majority of women with vaginal births practiced early SSC (86%), few (15%) of cesarean births did. Cesarean section was also the primary reason for mother/infant dyad separation with extended stay in the NBN. Facilitation of immediate SSC during cesarean is important among immigrant Hispanic women considering that they are more likely to supplement with formula during the first two days of life and that have been shown that women with cesarean are less likely to initiate breastfeeding [33]. Our study showed that indifferent of the type of delivery, mothers/infant dyads that practiced early SSC were more likely to be EBF at discharge from maternity stay versus mothers/infant dyads that did not practice early SSC. Other studies in the general population have indicated that SSC improves breastfeeding rates during hospitalization [18].

Nearly all mothers initiated breastfeeding during their hospital stay (95%). However, 42% of the total group of mothers supplemented with formula before their discharge (Figure 1). This result corroborates previous reports that Hispanic women are more likely to initiate breastfeeding during hospital stay but also are likely to supplement with formula during the first two days after birth [9, 34]. As was discussed in the introduction, many Hispanic women report a fatalistic attitude about sufficient milk supply [10-12]. As we noticed in our additional analyses, the two most frequently cited reasons to stop EBF were perception of low breast milk production and experiencing pain with breastfeeding. These findings underscore the importance of lactation support during hospital stay and following discharge as a way to preserve the sustained duration and exclusivity of breastfeeding. Peer counseling interventions, visit a lactation consultant, group prenatal education, and hospital/Special Supplemental Nutrition Program for Women, Infants, and Children enhancements have been all described to greatly improve breastfeeding duration, or exclusivity [13]. Cultural concepts and language barriers are important consideration in supporting Hispanic immigrant women in their endeavor to EBF. When mothers are from a cultural background different from the healthcare provider, additional challenges are described including language, different cultural beliefs, mistrust, and illiteracy [35-38].

Early SSC did not have an effect on EBF likelihood at 1 month in this sample of Hispanic women, suggesting that SSC is an excellent intervention to promote initiation of breastfeeding but this alone does not influence sustained breastfeeding at 1 month. The multivariate model to determine predictors of EBF at 1 month showed that controlling for all other variables in the model, participation in early SSC was associated with a more than 7 times increases in the odds of EBF at discharge, but was not predictive of EBF at 1 month postpartum. Additionally, younger maternal age and increased prenatal infant feeding intention were associated with an increased likelihood of EBF at discharge and at 1 month. Contrary to findings from studies including other populations [40], our findings showed that younger maternal age was associated with a longer duration of EBP. However, a larger study should be conducted to verify if this is a particular behavior among immigrant Hispanic women. The higher the score on the IFI scale during the prenatal period, the more likely that the mother was EBF at 1 month after birth. This finding has a significant clinical implication

and highlights the importance to assess infant feeding intention during prenatal time as a way to identify Hispanic women that may be at risk of no EBF their infants. Additionally, health care providers may develop and implement interventions during routine prenatal care to increase intentions to breastfeed as a mode to enhance EBF in Hispanics. Maintaining of EBF for six or more months among Hispanic mothers has a particular significance as this may improve health outcomes, particularly decreased risk of childhood obesity and other infant health diseases [2, 39].

It is important to note that not all potential factors that influence initiation, duration and exclusivity of breastfeeding were examined in this study. Additionally, we used a convenience sample of Hispanic immigrant women living in Kentucky, which limits the representativeness of the sample. Some data were collected via record review and therefore available measures were limited to what was documented. For example, data on additional practice of SSC and rooming-in during hospitalization were not available. All of these data may be particularly relevant to the establishment of breastfeeding.

### **New Contribution to the Literature and Future Recommendations**

To the best of our knowledge, this is the first study that evaluated the effect of early SSC associated with EBF in a sample of Hispanic immigrant mothers. Based in our results, early SSC during delivery significantly increased initiation of EBF in this sample of Hispanic immigrant women. Mothers that delivery via vaginal were more likely to practice SSC. Birthing hospitals should make strong efforts to reduce unnecessary cesarean section as a way to facilitate SSC that will facilitate early initiation of EBF. Further research is warranted to identify the cultural components needed to maintain EBF following discharge for this vulnerable population, in order to provide assistance to extend the duration and exclusivity of breastfeeding among Hispanics as a health promotion and disease prevention activity.

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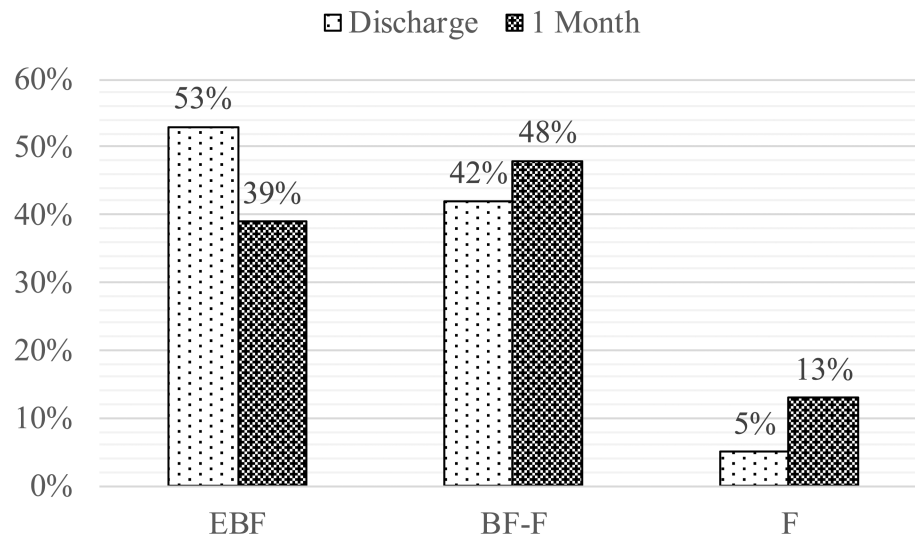
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EBF = Exclusive Breastfeeding

BF-F = Breastfeeding Supplementing with Formula

F = Only Formula

\*Note: 13 women lost to follow-up between discharge and 1-month assessment

**Figure 1.**

Percentage of mothers in each infant feeding category at discharge and 1-month (N =97)\*

**Table 1**Bivariate associations between demographic and clinical characteristics and early SSC ( $N = 97$ )<sup>\*</sup>

	Total Sample	Early Skin to Skin Care		P
		Yes (n = 65) Mean (SD) or n (%)	No (n = 32) Mean (SD) or n (%)	
<b>Maternal age</b>	27.8 (5.3)	27.5 (5.2)	28.4 (5.7)	.43
<b>Education</b>				.83
<b>HS or below</b>	87 (89.7%)	58 (66.7%)	29 (33.3%)	
<b>More than HS</b>	10 (10.3%)	7 (70.0%)	3 (30.0%)	
<b>Live with partner</b>				.054
<b>Yes</b>	80 (82.5%)	57 (71.2%)	23 (28.8%)	
<b>No</b>	17 (17.5%)	8 (47.6%)	9 (52.9%)	
<b>Mode of Delivery</b>				<.001
<b>Vaginal</b>	71 (73.2%)	61 (85.9%)	10 (14.1%)	
<b>Cesarean</b>	26 (26.8%)	4 (15.4%)	22 (84.6%)	
<b>Infant extended stay NBN</b>				<.001
<b>Yes</b>	19 (19.6%)	4 (21.0%)	15 (79.0%)	
<b>No</b>	78 (80.4%)	61 (78.2%)	17 (21.8%)	
<b>Prenatal Infant Feeding Intention</b>	11.9 (4.1)	12.1 (4.0)	11.5 (4.3)	.52
<b>EBF at discharge</b>				<.001
<b>Yes</b>	51 (52.6%)	44 (86.3%)	7 (13.7%)	
<b>No</b>	46 (47.4%)	21 (45.7%)	25 (54.3%)	
<b>EBF at 1-month</b> <sup>*</sup>				.44
<b>Yes</b>	33 (39.3%)	24 (72.7%)	9 (27.3%)	
<b>No</b>	51 (60.7%)	33 (64.7%)	18 (35.3%)	

*p* from two-sample samples t-test or chi-square test of association

Abbreviations: SSC = Skin-to-Skin Contact, NBN = Newborn Nursery, HS = High School, EBF = exclusive breastfeeding

<sup>\*</sup> Note: 13 women lost to follow-up between discharge and 1-month assessment

**Table 2**

Generalized estimating equation (GEE) analysis modeling the influence of early SSC on exclusive breastfeeding over time (n = 97) <sup>\*</sup>

	Parameter Estimate (Std. error)	p	Odds ratio (95% CI)
<b>Maternal age</b>	-0.07 (0.03)	.045	0.93 (0.88 – 0.99)
<b>Post-secondary education</b>	-0.80 (0.56)	.15	0.45 (0.15 – 1.35)
<b>Live with partner</b>	0.06 (0.38)	.87	1.06 (0.50 – 2.24)
<b>Vaginal delivery</b>	0.18 (0.53)	.34	1.20 (0.42 – 3.38)
<b>Prenatal Infant Feeding Intention</b>	0.16 (0.05)	.003	1.17 (1.06 – 1.29)
<b>Early SSC<sup>a</sup></b>	0.24 (0.58)	.67	1.27 (0.41 – 3.96)
<b>Time (Discharge)<sup>a</sup></b>	-0.61 (0.66)	.36	0.54 (0.15 – 1.98)
<b>Early SSC × Time (Discharge)<sup>a</sup></b>	1.75 (0.74)	.018	5.75 (1.35 – 24.52)
<b>Early SSC at discharge</b>	1.98 (0.71)	.005	7.37 (1.80 – 29.13)
<b>Early SSC at 1-month</b>	0.24 (0.58)	.67	1.28 (0.41 – 3.94)

Modeling the probability of exclusive breastfeeding

Abbreviations: HS = High School; NBN = Newborn Nursery; SSC = Skin-to-skin Contact; EBF = Exclusive Breastfeeding

<sup>\*</sup>Note: 13 women lost to follow-up between discharge and 1-month assessment

<sup>a</sup>Odds ratios are not directly interpretable because interaction term included in the model