



Short report

Influence of Valentine's Day and Halloween on Birth Timing

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ABSTRACT

It is known that cultural representations, in the form of stereotypes, can influence functional health. We predicted that the influence of cultural representations, in the form of salient holidays, would extend to birth timing. On Valentine's Day, which conveys positive symbolism, there was a 3.6% increase in spontaneous births and a 12.1% increase in cesarean births. Whereas, on Halloween, which conveys negative symbolism, there was a 5.3% decrease in spontaneous births and a 16.9% decrease in cesarean births. These effects reached significance at $p < .0001$, after adjusting for year and day of the week. The sample was based on birth-certificate information for all births in the United States within one week on either side of each holiday across 11 years. The Valentine's-Day window included 1,676,217 births and the Halloween window included 1,809,304 births. Our findings raise the possibility that pregnant women may be able to control the timing of spontaneous births, in contrast to the traditional assumption, and that scheduled births are also influenced by the cultural representations of the two holidays.

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Previous research has demonstrated that cultural representations, in the form of societal-based stereotypes, are able to influence physical functioning (Levy, Slade, Kunkel, & Kasl, 2002). The present study examined, for the first time, whether another form of cultural representations, salient holidays, may extend its influence to spontaneous births (i.e., non-induced vaginal), which have been considered outside the control of pregnant women.

Additionally, we examined the effect of cultural representations on scheduled births (i.e., cesarean and induced). In a study of Taiwanese births, it was found that an increase in cesarean procedures was associated with auspicious days and a decrease was associated with inauspicious days (Lo, 2003). The auspicious–inauspicious designations were based on traditional Chinese cosmological interpretations of the lunar calendar that are applied to events across the lifespan—including childbirth (Lo, 2003).

In the present study, we extended that approach by using an 11-year sample of all births in the United States to consider whether both spontaneous and scheduled births may be associated with the occurrence of holidays not previously shown to have this relationship. The two holidays we selected convey positive and negative cultural representations, respectively: Valentine's Day, associated with flowers and love; and Halloween, associated with witches and death. It seemed plausible that there would be opposite implications for birth timing, insofar as pregnant women perceived Valentine's

Day as a favorable day and Halloween as an unfavorable day. For the purpose of our research, these holidays have the advantage of widespread participation, but without ordinarily resulting in the absence of physicians from work, as on certain federal holidays. We predicted that a peak in births would occur on Valentine's Day for spontaneous births as well as scheduled births, and that a dip would occur on Halloween for these forms of delivery.

Method

Using a dataset comprised of all birth-certificate information in the United States, we examined births that took place within one week on either side of Valentine's Day and Halloween, from 1996 to 2006 (2006 was the most recent data year available from the National Center for Health Statistics at the time of this study in 2010). The Valentine's-Day window included 1,676,217 births and the Halloween window included 1,809,304 births. Two-week periods have been effectively used to assess the impact of events on birth rates (e.g., Gans & Leigh, 2009).

Analyses of covariance were used to examine whether daily-birth counts differed between the holidays and non-holidays for each of three delivery methods: spontaneous, cesarean, and induced. All models were adjusted for weekday and year, both of which can influence birth timing (Martin et al., 2007). The holiday models demonstrated good model fit, and explained a high percentage of variance ($R^2 = .97, .95, .98$ for Valentine's Day and $R^2 = .97, .95, .98$ for Halloween, relating to spontaneous, cesarean, and induced births, respectively).

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To determine the generalizability of the findings, we considered whether the birth-timing results of the larger sample were similar for minority groups. Specifically, we repeated the analyses conducted in the total sample with a subsample of all African Americans and Mexican Americans, the largest Hispanic-American population in the United States (Guzman, 2001).

Results

There was a statistically significant increase in the number of spontaneous and cesarean births on Valentine's Day, compared to the other days in the window covering the week before and the

week after the holiday (see Fig. 1). The likelihood of giving birth on Valentine's Day increased overall by 5.0% (3.6%, 12.1%, and 3.4% for spontaneous, cesarean, and induced births, respectively). Valentine's Day had a yearly average of 234 more spontaneous births ($SE = 32, p < .0001$), 353 more cesarean births ($SE = 70, p < .0001$), and 58 more induced births ($SE = 31, p = .06$) than the other days in the window, in a model adjusting for weekday and year.

In contrast, there was a statistically significant decline in the number of spontaneous, cesarean, and induced births on Halloween, compared to the other days in the 15-day period. The likelihood of giving birth on Halloween declined overall by 11.3% (5.3%, 16.9%, and 18.7% for spontaneous, cesarean, and induced

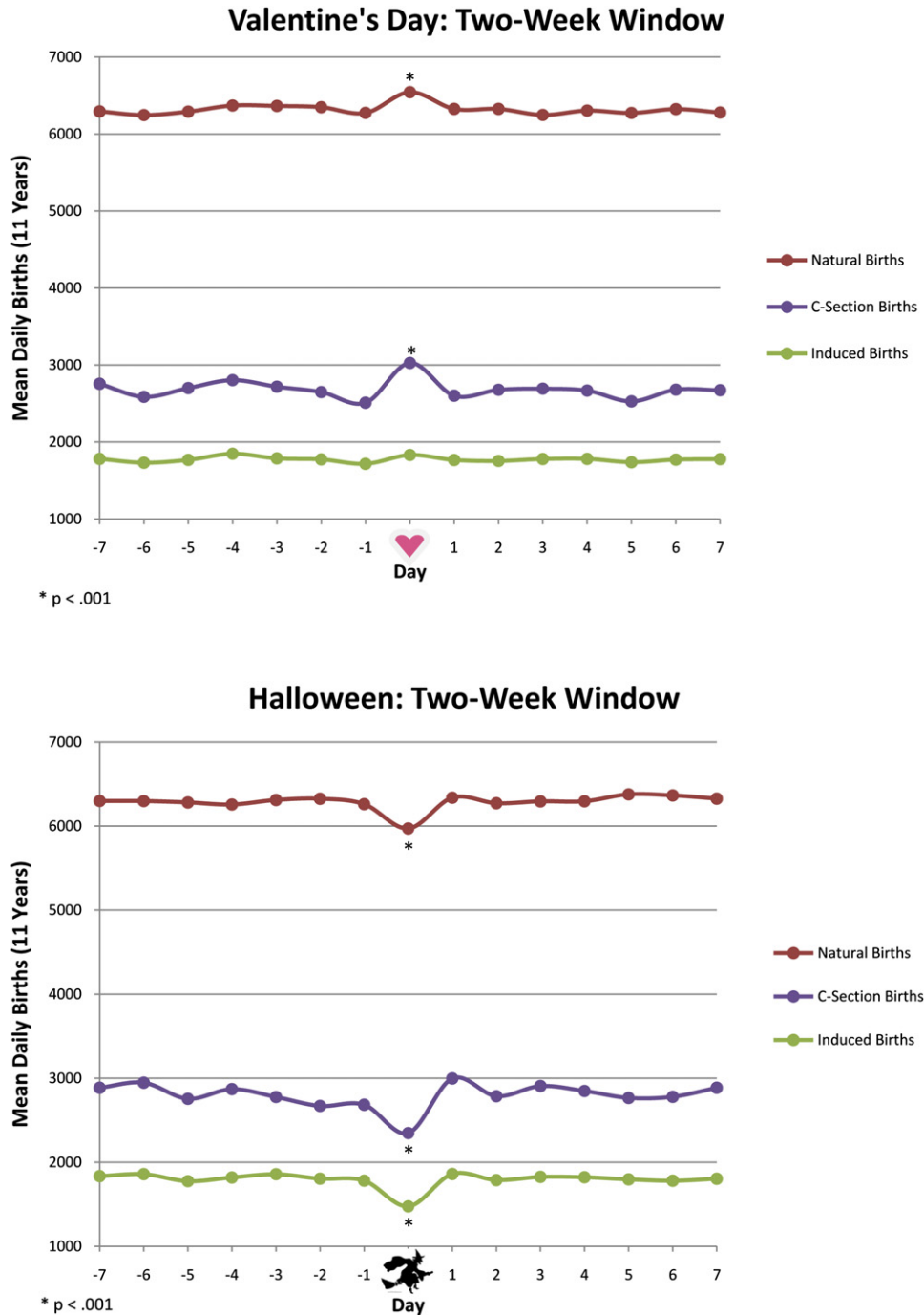


Fig. 1. Effect of Valentine's Day and Halloween on timing of births.

births, respectively). Halloween had a yearly average of 351 fewer spontaneous births ($SE = 33, p < .0001$), 508 fewer cesarean births ($SE = 76, p < .0001$), and 359 fewer induced births ($SE = 31, p < .0001$) than the other days in the window, in a model adjusting for weekday and year.

The holiday effects were also found in the subsample of African–American and Mexican–American women. The likelihood of their giving birth on Valentine's Day increased overall by 9.1% (4.8%, 19.4%, and 9.8% for spontaneous, cesarean, and induced births, respectively). The model adjusting for weekday and year revealed a yearly average of 121 more spontaneous births ($SE = 48, p = .008$), 193 more cesarean births ($SE = 80, p = .01$), and 204 more induced births ($SE = 55, p = .37$) on Valentine's Day than the other days in the window. The likelihood of African–American and Mexican–American women giving birth on Halloween decreased overall by 7.1% (3.9%, 14.3%, and 10.0% for spontaneous, cesarean births, and induced births, respectively). The model adjusting for weekday and year revealed a yearly average of 93 fewer spontaneous births ($SE = 22, p < .0001$), 132 fewer cesarean, ($SE = 36, p < .0001$), and 51 fewer induced births ($SE = 17, p = .002$) on Halloween than the other days in the window.

Discussion

As predicted, the number of spontaneous and cesarean births showed a statistically significant peak on Valentine's Day, and the number of spontaneous, cesarean, and induced, births showed a statistically significant dip on Halloween. The results were found in a sample of all births in the United States that occurred during the week before and the week after these holidays across 11 years.

This study raises the possibility that the assumption underlying the term “spontaneous births,” namely, that they are outside the control of pregnant women, is erroneous. For it appears that pregnant women can expedite or delay spontaneous births, within a limited time frame, in response to cultural representations. A previously unnoticed psychophysiological mechanism may explain this pattern: the positive connotations of Valentine's Day may increase a pregnant woman's will to initiate birth and the negative connotations of Halloween may precipitate her will to resist giving birth; both tendencies may then influence the hormonal mechanism that controls birth timing. Future research is needed to identify the process.

The first year of the data used by this study, 1996, coincided with the beginning of a rapid increase in the national rate of cesarean procedures (including those with no reported medical indications), and continued throughout the remaining ten years (MacDorman, Menacker, & Declercq, 2008). The increase is at least partly attributable to the rise in maternal autonomy (Minkoff & Chervenak, 2003). This autonomy could facilitate the pregnant woman's choice of cesarean procedures on Valentine's Day. The underlying premise of maternal autonomy is that pregnant women will be provided with the necessary background for informed consent (Walker, 2005). Yet, obstetric professional organizations have taken opposing positions on whether elective cesarean procedures are ethical (Leeman, 2005); these procedures entail both risks (e.g., Häger et al., 2004) and benefits (e.g., Farrell, Allen, & Baskett, 2001). Such inconclusiveness contrasts with the conclusiveness of the connotations of Valentine's Day as well as Halloween, and, therefore, might give these holidays additional weight when the pregnant woman considers the appropriateness or inappropriateness of a cesarean procedure.

The cultural representations of both holidays resonate with symbolism. Yet, Halloween had greater influence on birth timing, for all forms of delivery, than Valentine's Day. The symbols of Valentine's Day, such as cherubs, may provide a heightened sense

of childbirth's propitiousness; but, insofar as childbirth itself is regarded as propitious, there would be a certain amount of redundancy to Valentine's Day that may limit its effect for both spontaneous and scheduled births. However, the symbols of Halloween, such as skeletons, are not only a contrast to the propitiousness of childbirth, they may be perceived as a threat to it; hence, this holiday would have a greater impact than Valentine's Day in the context of birth timing.

It is anomalous that Halloween can have a profound effect on pregnant women while it can provide a lighthearted diversion for children. A likely explanation for this disparity is that, in late pregnancy, women tend to experience heightened psychological vulnerability, particularly to anxiety (Pearson, Lightman, & Evans, 2009).

Our findings indicate the need to adapt obstetric staffing on Valentine's Day and Halloween to the respective peaks and dips of births. In the case of increased elective cesarean procedures on Valentine's Day, these adjustments might extend to planning for: the longer hospital stays they entail; the greater risk of infants' respiratory problems; and, if pregnant women previously had the procedure, the greater risk of complications (National Institutes of Health, 2006).

More broadly, our findings demonstrate the utility of using a biocultural model (for review, see McElroy, 1990) to explore birth timing. This approach is based on the theory that a methodology which integrates biological and cultural domains provides an accurate reflection of these domains' integration in everyday life.

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