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Firstborns buy better for the greater good: Birth order differences in green consumption values

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ABSTRACT

Despite multiple studies on the role of birth order in shaping human personality, marketing literature has largely neglected its role in shaping consumer behavior. We conducted a high-powered birth-order study on several consumption-related measures ($N_{\text{main analyses}} = 1358$), which consistently enabled us to detect effect sizes even smaller than $d = 0.20$ with a power of 0.90. Participants filled out scales measuring susceptibility to normative interpersonal influence, the need for uniqueness, and the tendency to express the value of environmental protection through purchases and consumption behaviors. At a general level, we did not find any support for the notion that firstborns (vs. laterborns) are more susceptible to normative interpersonal influence or have a lower need for uniqueness. However, we found robust results regarding green consumption values, with firstborns valuing sustainability and proenvironmental consumption more than laterborns. Considering the number of consumers with siblings in the world and bearing in mind the ease with which birth-order data can be collected, these findings may have implications for activities aimed at mitigating climate change. However, the novel nature of our results calls for appropriate caution.

In 2019, 16-year-old climate activist, Greta Thunberg, condemned world leaders at the United Nations Climate Action Summit in New York City for their inaction on climate change issues (Milman, 2019). Her emotional speech went viral and described a situation where people are suffering and where the world faces a mass extinction due to the collapse of entire ecosystems caused by climate change. Interestingly, Greta has a younger sister and is the firstborn in a family of four (Carpenter, 2020). While seemingly spurious, could it be that Greta's birth order may affect her deep concern about climate change and her fight for a sustainable future? The present research aims to address this possibility.

Despite multiple articles on the role of birth order in shaping human personality (e.g., Rohrer et al., 2015; Sulloway, 1995), the existing literature has largely neglected this variable in relation to consumers' preferences and choices (Claxton, 2015). Indeed, birth-order research has extensively focused on personality traits without examining other important aspects of social life (Salmon et al., 2016). Nevertheless, birth order has been conceptualized as a factor potentially linked to consumers' decision-making, buying, and post-purchase processes (Rink, 2010) and a likely predictor of financial risk tolerance (Rink et al., 2013). Still, only a handful of studies have investigated the connection

between birth order and consumption-relevant outcomes, with some rare evidence suggesting that it can act as a possible market segmentation variable (Claxton, 1995) and a predictor of consumers' materialism levels (Zemanek et al., 2000) as well as their inclination to display (non-)conforming behaviors in the marketplace (Saad et al., 2005).

The few consumption-related studies on birth order that exist are characterized by relatively small sample sizes, ranging from $N = 156$ (Claxton, 1995) to approximately 300 participants (Saad et al., 2005; Zemanek et al., 2000), which is problematic from a statistical power perspective, given that the effect sizes reported in birth-order research are usually small (Rohrer et al., 2015; Sulloway, 2001). For instance, the effect size calculated from differences in materialism levels between firstborns and lastborns, as reported in Zemanek et al. (2000), is $d = 0.16$.

1. Research rationale

To counter concerns with small samples, we conducted a high-powered study including more than 1000 participants aimed at investigating whether firstborns (vs. laterborns) exhibit stronger values

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linked to green consumption, defined as “the tendency to express the value of environmental protection through one’s purchases and consumption behaviors” (Haws et al., 2014; p. 337). To our knowledge, this potential relationship has not been examined. Moreover, given the documented birth-order differences regarding consumers’ susceptibility to normative interpersonal influence (Saad et al., 2005), and the psychometrically validated link between susceptibility to normative interpersonal influence and consumers’ need for uniqueness (Ruvio et al., 2008), we also tested for birth-order effects on these constructs. This was done to increase the internal validity of the study and hence ensure that our focal construct of interest (i.e., green consumption values) would not merely reflect a rebellious disposition, which has previously been discussed in the birth-order literature in terms of nonconformism and a need for uniqueness (Sulloway, 1995).

Numerous factors play a pivotal role in shaping sustainable consumption, including individual differences, social norms, and social desirability aspects (Goldstein et al., 2008; Schultz et al., 2007; White et al., 2019). Of particular importance for the current investigation, individual differences in green consumption values constitute a key predictor of consumers’ propensity to use products and services in a proenvironmental way (Haws et al., 2014). Because firstborns tend to be slightly more intelligent (Rohrer et al., 2015) and more conscientious than laterborns (Sulloway, 1995), they should express stronger values linked to responsibility-related issues, such as environmental conservation, sustainability, and green consumption, given that these values are associated with both intelligence and conscientiousness (Hirsh, 2010; Kvasova, 2015; Milfont & Sibley, 2012; Salahodjaev, 2016). Additionally, firstborns show stronger kin care tendencies than laterborns as they spend more time in face-to-face contact with siblings (Pollet & Nettle, 2007). Proenvironmental consumption has recently been discussed as a kin care response linked to prosociality (Palomo-Vélez & van Vugt, 2021). Given that firstborns frequently share some responsibilities with parents by caring for and teaching their younger siblings, they often act as surrogate parents (Hughes et al., 2018; Sulloway, 2001). A large study involving almost 900 participants supports the link between birth order and prosociality: siblings with more senior positions exhibited more prosocial tendencies than lastborns (Schwär & Mahony, 2012). Thus, we test whether firstborns (vs. laterborns) score higher on a scale measuring the tendency to consume goods and services sustainably.

2. Method

We conducted an a priori stochastic power simulation in R (Bolker, 2007) to find the minimum sample size required to find statistically significant differences between firstborns and laterborns. Our power simulation revealed that 1100 and 1350 participants were necessary to achieve the power of 0.90 and 0.95, respectively, to detect small effects equivalent to Cohen’s $d = 0.20$. To account for missing data, we recruited 1400 participants (59.9% female; $M_{\text{age}} = 40.66$ years, $SD = 12.55$; range: 18–80 years) from Prolific Academic who indicated having English as their first language. Participants lived in countries where English was the official language, had a submission approval rate equal to or above 99%, and received a monetary payment of £1.25 for taking part in the study. Three participants were discarded due to missing data. We further excluded “only-child” participants ($n = 39$), as they cannot be compared with any siblings and hence are uninformative for birth-order analyses (cf. Rohrer et al., 2015).¹ Thus, the final sample consisted of 1358 participants in our main analyses (see the Results section for sample details on our additional robustness tests). Similar to the approach advocated by Rohrer et al. (2015), we did not distinguish between participants who had full, half, step, or adoptive siblings.

¹ The inclusion of “only-child” participants as firstborns does not change the nature or significance of our results.

However, participants indicated the number of siblings they had spent at least 12 years with in the same household, thus mitigating possible confounds associated with patchwork families.

Participants filled out a series of measures, including the 8-item normative subdimension of the consumer susceptibility to interpersonal influence scale (Bearden et al., 1989; e.g., “It is important that others like the products and brands I buy”), the 12-item consumer need for uniqueness scale (Ruvio et al., 2008; e.g., “I actively seek to develop my personal uniqueness by buying special products or brands”), and the 6-item GREEN scale (Haws et al., 2014; e.g., “My purchase habits are affected by my concern for our environment”); see the Supplemental Material for a complete list of scale items.

To mitigate common method bias (Podsakoff et al., 2003), we varied the number of scale points and the order of responses, with the need for uniqueness scale (1 = disagree strongly; 6 = agree strongly) and the GREEN scale (1 = strongly disagree; 7 = strongly agree) having the highest agreement placed as the rightmost answer, and the normative influence subscale (1 = strongly disagree; 7 = strongly agree) having the opposite order. Participants’ responses were averaged to create a composite index of each scale, which showed satisfactory reliability (Normative influence: $\alpha = 0.919$; Need for uniqueness: $\alpha = 0.925$; GREEN: $\alpha = 0.945$).²

Following other birth-order studies (Rohrer et al., 2015; Saad et al., 2005), we collected data on participants’ sibship size, sex, and age to control for these variables in the analyses. Regarding sibship size, there are more laterborns in larger sibships, and differences between firstborns and laterborns may occur due to laterborns being more likely to be born into families with a lower socioeconomic status, which can be associated with other individual differences. However, because there should be no link between birth-order position and parental socioeconomic status beyond what is captured through sibship size, further measures of parental socioeconomic were not used (Rohrer et al., 2015).

3. Results

We report our analyses in the following order: First, we report an independent samples t -test to examine whether firstborns ($n = 585$) differ from laterborns ($n = 773$) on the GREEN scale. Next, we present the partial correlation between birth order and green consumption values while controlling for participants’ age, sex, and sibship size. Subsequently, we report the results of a multiple linear regression, using birth order, age, sex, and sibship size as the predictors, and the GREEN scale as the outcome variable. Finally, we test for birth-order differences between participants whose birth order equals first ($n = 585$), second ($n = 455$), or third ($n = 190$), accounting for 90.57% ($N = 1230$) of the sample used in our main analyses. Following Rohrer et al. (2015), who excluded categories that made up less than 11% of the sample due to small cell sizes and hence insufficient statistical power to detect modest effects for these categories, we omit birth orders of 4 and higher (9.4%) in these final robustness tests; see Table 1 for the birth order and sibship size distributions in our sample. The results for the scales measuring susceptibility to normative interpersonal influence and need for uniqueness did not yield any significant birth-order differences in the above-stated analyses ($ps > 0.10$), thus further ruling out the possibility

² An anonymous reviewer requested us to conduct factor analyses on these scales and demonstrate discriminant validity. Confirmatory factor analyses verified the presumed factor structure for each of our scales; see the Supplemental Material. Regarding discriminant validity, the GREEN scale correlated weakly with the normative interpersonal influence scale ($r = -0.060$, $p = .026$) and the consumer need for uniqueness scale ($r = 0.148$, $p < .001$), with the latter two scales showing a moderate association ($r = 0.223$, $p < .001$) according to current conventions (Funder & Ozer, 2019). Therefore, given the modest associations between these scales, they can be assumed to capture qualitatively distinct constructs.

Table 1
Birth order and sibship size percentages.

Birth order	Percent	Cumulative percent	Sibship size	Percent	Cumulative percent
1	43.1	43.1	2	48.4	48.4
2	33.5	76.6	3	28.6	77.0
3	14.0	90.6	4	13.2	90.1
4	5.6	96.2	5	4.8	94.9
≥5	3.8	100.0	≥6	5.1	100.0

Note: The highest birth order was 10, and the largest sibship size was 15 in the present study.

that all scales would capture the same overarching construct; see Supplemental Material for details.

3.1. Independent samples t-test

Firstborns ($M_{\text{first}} = 5.17, SD = 1.28$) scored significantly higher than laterborns ($M_{\text{later}} = 4.94, SD = 1.35$) on the GREEN scale ($t(1356) = 3.131, p = .002, r = 0.085$), indicating that their purchases and consumption preferences reflect a greater concern for environmental protection; see Fig. 1.

3.2. Partial correlation

After having controlled for participants' age, sex, and sibship size, the partial correlation between birth order and the GREEN scale remained significant ($r = 0.077, p = .004$).

3.3. Multiple linear regression

Within the context of birth-order effects, the GREEN scale yielded a significant overall model ($R^2 = 0.011; p = .004$), with birth order (standardized $\beta = 0.080; p = .004$) and age (standardized $\beta = 0.055; p = .044$) as significant predictors, and with participants' sex (standardized $\beta = -0.029; p = .290$) and sibship size (standardized $\beta = -0.014; p = .612$) as nonsignificant predictors. Crucially, birth order formed the strongest association with the GREEN scale among all predictors.

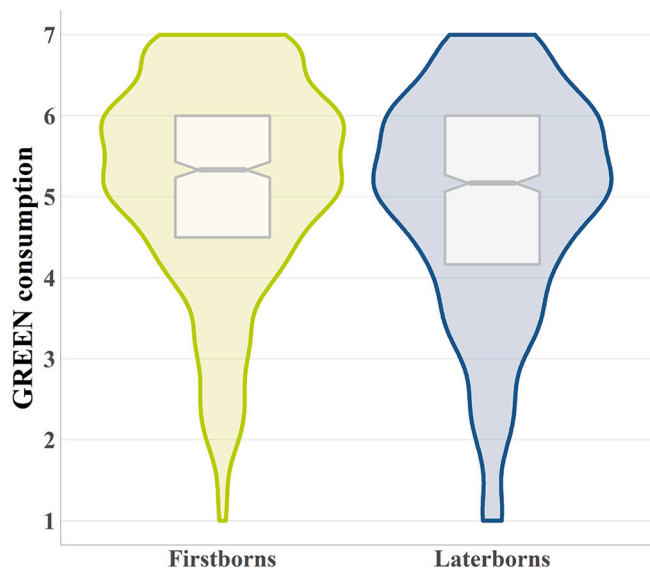


Fig. 1. GREEN consumption scores for firstborn vs. laterborns. Horizontal lines indicate medians; notches around these lines show 95% confidence intervals around medians. White box plots show interquartile ranges. The shaded areas in the violin plots depict response densities. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

3.4. Robustness checks

A one-way ANOVA found a significant impact of birth order (first, second, third) on the GREEN scale ($F(2, 1227) = 5.820, p = .003, \eta_p^2 = 0.009$). Follow-up planned contrasts revealed that firstborns scored significantly higher than participants whose birth order equaled second and third ($t(1227) = 3.410, p < .001$), whereas these latter groups did not differ significantly ($t(1227) = 1.115, p = .265$); see Table 2. Controlling for participants' age, sex, and sibship size did not change the nature or significance of these results ($F(2, 1224) = 5.457, p = .004, \eta_p^2 = 0.009$).

4. Discussion

To our knowledge, the present study is the first to investigate the link between birth order and a set of consumption-relevant scales with high statistical power. Contrary to former meta-analytic evidence suggesting that firstborns exhibit more conforming and traditional attitudes and, hence, are less open to new experiences than laterborns (Sulloway, 1995), we did not find any general support for this thesis. Specifically, firstborns and laterborns had virtually identical scores on the consumer need for uniqueness scale (Ruvio et al., 2008) and the susceptibility to normative interpersonal influence scale (Bearden et al., 1989). The latter finding is particularly interesting considering one of the few former birth-order studies in the consumption domain, where Saad et al. (2005), using the same scale, found firstborns to consistently exhibit more conforming responses than their younger siblings. Thus, our findings indicate that birth-order differences on aspects linked to openness and conformity may be less generalizable than what has previously been assumed.³

Importantly, however, our findings do not suggest that the birth-order effects demonstrated by Saad et al. (2005) are non-existent. On the contrary, restricting our analyses to a more age homogeneous sample (cf. Sundie et al., 2019) with ages ranging from 18 to 30, thus representing a sample size ($N = 345$) and age profile ($M_{\text{age}} = 26.12, SD = 3.13$) comparable to that of Saad et al. (2005) found firstborns ($M_{\text{first}} = 3.11, SD = 1.31$) to score significantly higher than laterborns ($M_{\text{later}} = 2.73, SD = 1.32$) on susceptibility to normative interpersonal influence ($t(343) = 2.605, p = .010, r = 0.138$); see Supplemental Material for additional analyses.

More central for the current investigation, we found a robust, general birth-order difference in green consumption values (Haws et al., 2014), with firstborns consistently expressing significantly more pro-environmental values than laterborns. Considering firstborns' documented inclination to show stronger kin care tendencies (Pollet & Nettle, 2007) and recent scholarly work linking proenvironmental consumption to kin care and prosociality (Palomo-Vélez & van Vugt, 2021), our birth-

Table 2
Means (and standard deviations) for susceptibility to normative interpersonal influence, need for uniqueness, and GREEN consumption values depending on birth order (first, second, third).

Scale	Birth order		
	First	Second	Third
Normative influence	2.64 ^a (1.33)	2.59 ^a (1.26)	2.64 ^a (1.26)
Need for uniqueness	2.77 ^a (1.08)	2.70 ^a (1.03)	2.88 ^a (1.07)
Green consumption	5.17 ^a (1.28)	4.96 ^b (1.37)	4.83 ^b (1.37)

Note: Row-specific means with different superscripts are significantly different ($p < .05$).

³ Indeed, our obtained effect size on susceptibility to normative interpersonal influence is significantly weaker than that reported by Saad et al. (2005), $Z = 2.51, p = .012$.

order results are likely related to responsibility aspects stemming from kin care. Specifically, firstborns frequently share some responsibilities with parents, caring for their younger siblings (Hughes et al., 2018; Sulloway, 2001), with such caring components linked to conscientiousness according to meta-analytic work (Sulloway, 1995).

Although our effect size for the birth-order difference in green consumption values only lies between the 15th and 20th percentile compared to the magnitude of published effects in personality and social psychology (Gignac & Szodorai, 2016; see also Roberts et al., 2007), this result may have practical implications. First, most consumers have siblings; hence, they are under the influence of birth-order effects. Second, birth-order data can be collected as efficiently as basic demographics, yielding insights for customer segmentation and tailor-made marketing messages (Claxton, 1995). Thus, multiply our birth-order effect by the number of consumers with siblings in the world and bear in mind the ease with which birth-order data can be collected, and it should be evident why companies may want to consider these findings. Still, future work is needed before these tentative results can be confidently put into practice.

4.1. Limitations and future research

People sometimes use proenvironmental consumption and other acts of conspicuous conservation to form a desired social image, particularly in public consumption contexts (Griskevicius et al., 2010). Therefore, our results are likely not immune to social desirability bias. However, we tried to minimize the impact of this bias source by using a self-administered, web-based, and anonymous survey, given that this data collection technique tends to yield more honest responses than alternatives where researchers are physically present (Kreuter et al., 2008). Additionally, most participants in our study likely responded to the survey in a more private setting (i.e., at home) than what has been the case in most former birth-order studies in the consumption domain, which have relied on in-class survey administration procedures (Claxton, 1995; Saad et al., 2005). Our recruitment through a crowdsourced online platform can also be justified by research indicating that participants from such platforms are more attentive to instructions, with studies on online panel participants often yielding larger effect sizes than studies based on student samples (Hauser & Schwarz, 2016). The latter should be particularly important in research contexts where the assumed effect sizes are small, such as in the current case. Nevertheless, future studies should use more sophisticated methods to rule out social desirability bias, such as indirect phrasing of survey items (Fisher, 1993; see also Podsakoff et al., 2003).

Birth spacing (i.e., the age difference between siblings) affects maternal behaviors toward infants, with middle-spaced infants receiving less attention from their mothers than closely and widely spaced siblings (Lewis & Kreitzberg, 1979). Recent studies link birth spacing to personality traits (Golsteyn & Magnée, 2017). As we did not measure birth spacing in the present research, future studies should test whether this factor could also be associated with green consumption values.

As a result of divorce, remarriage, and reunification, many children now live in “blended families,” defined as households with stepsiblings or stepparents. According to Pew Research Center (2015), about 16% of children in the United States live in such households. Consequently, children who are firstborns may become laterborns in a blended family, whereas laterborns may advance to more senior positions. To account for this potential confound, we asked participants to indicate how many siblings, including stepsiblings, they had lived with in the same household for at least 12 years. However, we cannot rule out the possibility that living with stepsiblings for fewer years may have influenced our results. Nevertheless, although Saad et al. (2005) only excluded 1% of participants because they had stepsiblings, we followed more recent birth-order research (Rohrer et al., 2015), which has not distinguished between participants with full, half, step, or adoptive siblings.

Recruiting participants from a heterogeneous sample is crucial to test the generalizability of a phenomenon, whereas homogeneous samples may reduce the influence of confounding variables, providing rigor and control (Shen et al., 2011). Therefore, we aimed to balance these two sampling approaches by recruiting participants from different, albeit culturally similar, countries considered Western, educated, industrialized, rich, and democratic (WEIRD; Henrich et al., 2010). Although our selected sampling approach could add potential confounds, the current study was highly powered. Still, research has found birth order effects on personality traits to be culturally contingent among non-WEIRD participants (Botzet et al., 2020), thus highlighting the need to test whether our findings replicate in non-WEIRD cultures (Folwarczny et al., 2021; Otterbring, 2021; Otterbring et al., 2020).

Engaging in sustainable consumption necessitates solving the self-other trade-off (White et al., 2019), with sustainable consumption usually entailing some sort of self-sacrifice (e.g., paying a higher price for eco-labeled products). Our findings suggest that firstborns may be less sensitive to self-sacrifices for the greater good, presumably because they often act as surrogate parents taking care of their younger siblings (Sulloway, 2001). Alternatively, they may derive more value from self-sacrifices, considering that people gain a sense of personal importance as a positive side-effect of environmental activism (Jasko et al., 2019). Future studies should test these possibilities.

Sustainable behaviors are future-oriented (White et al., 2019), and people differ in the extent to which they focus on present or future events (Gidlöf et al., 2021; Otterbring, 2019; Rojas-Rivas et al., 2020). Hence, additional research is needed to examine whether firstborns are more future-oriented than laterborns. Finally, high self-efficacy likely increases the propensity to engage in sustainable behaviors (White et al., 2019). Therefore, considering that firstborns are more persistent, more inclined to accept personal responsibilities, and are more likely to occupy managerial positions (Black et al., 2018), scholars should test whether they also exhibit a higher degree of self-efficacy.

5. Conclusion

Promoting proenvironmental consumption is vital to mitigate climate change. This high-powered study found a robust relationship between birth order and green consumption values, with firstborns expressing the greatest environmental concerns in their purchases and consumption habits. Therefore, marketers may strategically use birth-order data to create tailored messages that maximize firstborns' likelihood of going green. Such messages may also motivate firstborns to sway their siblings to sustainable shopping and persuade parents to more proenvironmental purchasing patterns. Indeed, Greta Thunberg challenged her entire family to lower their carbon footprint by minimizing meat consumption, valuing veganism, and giving up flying due to her deep care for the climate and strong environmental engagement (Wright, 2019).

CRedit authorship contribution statement

Tobias Otterbring: Conceptualization, Methodology, Formal analysis, Writing – original draft, Writing – review & editing, Project administration, Funding acquisition. **Michał Folwarczny:** Conceptualization, Methodology, Investigation, Data curation, Writing – original draft, Writing – review & editing.

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Appendix A. Supplementary data

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