Journal of Research in Personality 45 (2011) 500–503

Contents lists available at ScienceDirect

Journal of Research in Personality

journal homepage: www.elsevier.com/locate/jrp

Brief Report

Born to learn or born to win? Birth order effects on achievement goals

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ARTICLE INFO

Article history:
Available online 30 June 2011

Keywords:
Achievement motivation
Achievement goals
Goal orientation
Mastery goals
Performance goals
Environmental influence
Birth order

ABSTRACT

Given the widespread use and well-known consequences of achievement goals in different competence-relevant situations, it is important to gain a thorough understanding of how these differences in goal pursuit are formed. Using different analytic approaches, we show that birth order lies at the heart of people's goal preferences as we consistently found that firstborns have developed a preference for mastery goals (which are based on *self*-referenced standards of competence), whereas secondborns have developed a preference for performance goals (which are based on *other*-referenced standards of competence). These findings may help explain why people differently define, experience, and respond to competence-relevant situations, including the workplace, the classroom, and the ball field.

1. Introduction

From Cain and Abel to the recent race between the Miliband brothers for the leadership of the British Labour Party, younger siblings outperforming their older siblings have intrigued mankind throughout history. The notion that family dynamics experienced by siblings during early childhood might have an impact on motivational strivings in adulthood seems intuitively appealing. As a result, stories linking different upbringing of siblings to later success in life have been widespread in lay psychology and popular media, although often unsubstantiated by empirical evidence. In the current paper, we demonstrate that birth order shapes achievement motivation in later years. To date, Achievement Goal Theory (AGT) is arguably the dominant theory of achievement motivation explaining individuals' motivational strivings in various aspects of life, including work (e.g., Payne, Youngcourt, & Beaubien, 2007) and education (e.g., Elliot & Murayama, 2008). As noted by Hulleman, Schrager, Bodmann, and Harackiewicz (2010, p. 422), "AGT has inspired over 1000 published papers and dissertations on achievement motivation in the past 25 years." According to AGT, individuals' (mal)adaptive attitudes, cognitions, and behaviors in achievement settings are influenced by their goal preferences (Dweck, 1986; Elliot, 2005). These are conceptualized by a mastery-performance distinction: *mastery goals* involve the aim of improving one's own performance and are based on *self*-referenced standards of competence. *Performance goals* reflect the pursuit of outperforming others and are based on *other*-referenced standards of competence.[1]

Given the widespread use and well-known consequences of achievement goals in different competence-relevant situations, it is important to gain a thorough understanding of how these differences in goal pursuit are formed. It is widely agreed that achievement goal preference is a function of both individual differences and the specific situation (e.g., DeShon & Gillespie, 2005; Elliot, 2005; Payne et al., 2007). Although experimental lab research shows that the influence of situational cues in goal pursuit should not be underestimated (e.g., Van Yperen, 2003), field research has shown that, in the long term, between-person differences in goal orientations have a pervasive effect on achievement outcomes (Payne et al., 2007).

The aim of the current study is to investigate how these individual differences in achievement goal preferences are formed. Even though psychological factors (e.g., individuals' self-theories, perceived competence, fear of failure) have been advanced as antecedents of between-person variation in goal preference (see Elliot, 2005), it is important to go beyond this focus on proximal antecedents to attain a basic understanding of determinants that are more fundamental, i.e., genetic factors and environmental influences during childhood. Recent research has found both sources to be important influences on achievement goal pursuit (Murayama, Elliot, & Yamagata, 2011). However, as noted by Murayama et al. (2011, p. 250), a more fine-grained picture is desirable and thus

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[1] In this article, mastery and performance goals are discussed and measured as approach forms of regulation, meaning they are directed at positive outcomes (i.e., improving oneself and outperforming others, respectively).

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doi:10.1016/j.jrp.2011.06.008

we need "to determine the [...] unique environmental factors that underlie achievement goal adoption". In this study, we address this need by considering birth order as a fundamental antecedent of achievement goal pursuit. Birth order plays a key role in the establishment of the non-shared environment (Sulloway, 2001), the unique developmental influences that every child receives within a family, which appear to be the most important environmental influences (Plomin, 2004). Previous research has found birth order to affect intelligence (Kristensen & Bjerkedal, 2007) and personality (Paulhus, Trapnell, & Chen, 1999).

Smiley and Dweck (1994) reported that individual differences in achievement goals could already be observed in very young children. We propose that, next to genetic and other environmental factors, differential parental treatment of siblings within the family due to birth order, may be an important cause of the emergence of these early individual differences. During a brief period, firstborns are the only child within the family. Without siblings, parents have few standards available to evaluate their child's competence. As the firstborn child is the main point of reference, parents may tend to evaluate their firstborn's progress primarily by self-referenced standards (e.g., 'last week my baby could only crawl and now s/he is taking his/her first steps'). According to AGT assumptions, a self-referenced standard for evaluating competence is central to mastery goals (Dweck, 1986). Consequently, we hypothesize that firstborns have developed a preference for mastery goals.

In contrast, when evaluating the competence of secondborns, the older sibling is available as a reference. Hence, parents may be more likely to evaluate their secondborn's progress by standards set by the older sibling (e.g., 'my youngest baby takes his/her first steps sooner than his/her brother did'). This emphasis on *other*-referenced standards of competence is central to performance goals (Dweck, 1986). Hence, we hypothesize that secondborns have developed a preference for performance goals.

Although this study is the first to examine the relationship between birth order and achievement goals, such a link could provide converging evidence for previous assumptions in birth order research. For instance, a key assumption of Zajonc's Confluence model (1976), looking for an explanation for birth order effects on intelligence, is that firstborns hold a teaching function towards their younger sibling(s). Enacting a teaching role may facilitate the development of a predominant focus on development and task mastery.

2. Method

2.1. Participants

A sample of 375 undergraduate students was selected from a larger respondent group ($N = 505$) on the basis of the requirements for adequate birth order research including only (1) firstborns ($N = 211$) or secondborns ($N = 164$), (2) full siblings, and (3) siblings who grew up in the same family (Healey & Ellis, 2007). The mean sibship size was 2.49 ($SD = .72$), and the mean age difference between the first- and secondborn sibling (i.e., spacing) was 2.41 years ($SD = 1.21$). This is an appropriate age difference as birth order effects are most significant when spacing is not less than two and does not exceed 5 years (Healey & Ellis, 2007). In order to maximize the response, participants received a personalized feedback report on their motivational profile at the end of the survey.

2.2. Measures and analytic strategy

Participants rated their goal pursuit using the 3-item approach variants of mastery ($\alpha = .81$) and performance goals ($\alpha = .86$) from the Achievement Goal Questionnaire-Revised (Elliot & Murayama, 2008). The participants were asked to respond to the items on a 5-point scale, ranging from "Strongly disagree" to "Strongly agree". In line with the general view that achievement goal preference is a function of both individual differences and the specific situation (cf. supra), the items of the situation-specific achievement goal measure referred to respondents' goal strivings *in their studies*. A sample item assessing mastery goals is "In my studies, I am striving to understand the content of the courses as thoroughly as possible". A sample item assessing performance goals is "In my studies, my aim is to perform well relative to other students". To control for the variance shared by mastery and performance goals, we used residual scores, partialing out the variance shared with the other goal. Subsequently, we compared individual self-ratings of persons *across families*, by means of two ANOVAs with birth rank as fixed factor and self-ratings of mastery and performance goals, respectively, as dependent variable.

Although this analysis has the benefit that different rating sources from diverse backgrounds are compared on the basis of birth rank, the observed differences could be artifacts of uncontrolled variables, including SES and parental IQ (Rodgers, Cleveland, van den Oord, & Rowe, 2000). Hence, for a second analytical approach, the respondents also provided ratings of their sibling's mastery ($\alpha = .86$) and performance goals ($\alpha = .87$) (see also Healey & Ellis, 2007; Paulhus et al., 1999; Sulloway, 2001). Instead of comparing independent individuals across families, the sibling ratings were compared to the self-ratings *within families* to investigate whether achievement goal differences between siblings could be explained by differences in birth rank. This provides a natural control for potential between-family artifacts (Paulhus et al., 1999). Moreover, by these means persons assess their achievement goals on a more relative basis, in comparison to their siblings, which has been suggested to yield more accurate assessments (Goffin & Olson, 2011). The comparison of sibling ratings with respondents' self-ratings was conducted using planned comparisons in two ANOVAs, with rating target (self/sibling) as within-subjects factor, birth order as between-subjects factor, and residual mastery and performance goal ratings as dependent variables.

3. Results

The means and standard deviations of the raw and residual goal variables, as well as the correlations among them, for both the self and sibling ratings are reported in Table 1.

We first analyzed the data across families, by solely considering the self-ratings (and not the sibling ratings) and investigating the extent to which birth order can account for individual differences

Table 1
Means and standard deviations of the raw and residual goal scores, and correlations among them for the self and sibling ratings.

	M	*SD*	1	2	3	4
1. Mastery goals self						
Raw score	4.15	0.68	1			
Residual score	0	0.65	.96**			
2. Mastery goals sibling						
Raw score	3.76	0.91	.23**	1		
Residual score	0	0.82	.25**	.90**		
3. Performance goals self						
Raw score	3.41	0.87	.27**	.13*	1	
Residual score	0	0.83	.00	.07	.96**	
4. Performance goals sibling						
Raw score	3.26	0.94	.04	.44**	.46**	1
Residual score	0	0.84	−.08	.00	.44**	.90**

* $p < .05$.
** $p < .01$.

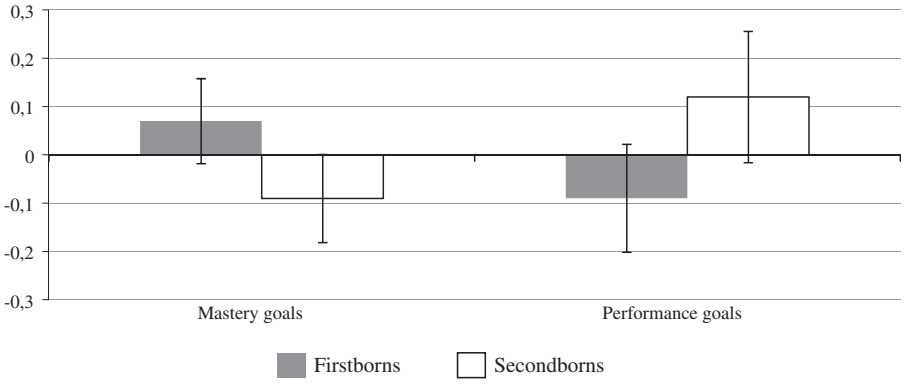

Fig. 1. Across-family analysis of the effects of birth order on mastery and performance goals. A positive (or negative) score indicates a higher (or lower) score compared to the sample average. Error bars denote 0.95 confidence intervals.

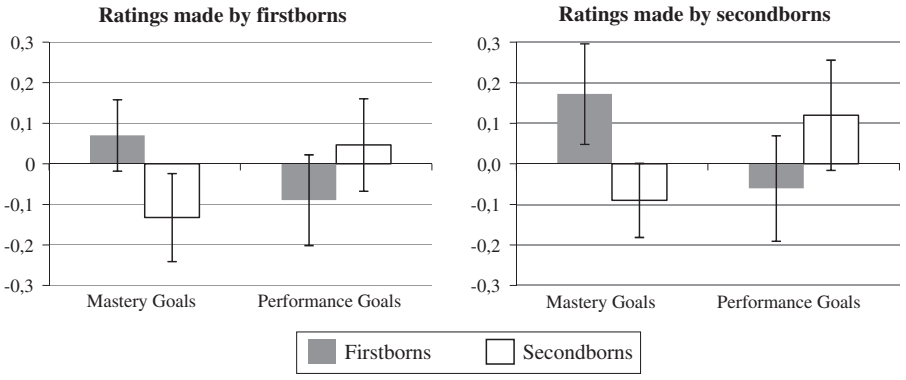

Fig. 2. Within-family analysis of the effects of birth order on mastery and performance goals. The left panel depicts the situation where the respondent is firstborn. The right panel depicts the situation where the respondent is secondborn. A positive (or negative) score indicates a higher (or lower) score compared to the sample average. Error bars denote 0.95 confidence intervals.

in these self-ratings. As shown in Fig. 1, it was found that firstborns ($M = .07$) reported to be more mastery-oriented than secondborns ($M = -.09$), $F(1,373) = 5.60$, $p < .05$, $d = .24$. This corresponds with an odds ratio (OR) of 1.54, meaning that firstborns are 54% more likely to have stronger mastery goals compared to secondborns.[2] In contrast, secondborns ($M = .12$) reported to be more performance-oriented than firstborns ($M = -.09$), $F(1,373) = 5.61$, $p < .05$, $d = .25$, $OR = 1.57$. These effects remained significant after controlling for age as a potential confounding factor: $\Delta R^2 = .015$, $F(1,372) = 5.47$, $p < .05$ for mastery goals, and $\Delta R^2 = .015$, $F(1,372) = 5.49$, $p < .05$ for performance goals.

To assess whether the results of the across-family analysis were confounded by between-family differences (e.g., parental IQ, SES), we also examined our hypotheses using a within-family analysis by comparing the self-ratings and sibling ratings of the respondents. The results are displayed in Fig. 2. The left panel shows that relative to their secondborn siblings, firstborns reported to be more mastery-oriented ($M = .07$ vs. $M = -.13$; $F(1,371) = 11.58$, $p < .001$; $d = .27$, $OR = 1.63$) and less performance-oriented ($M = -.09$ vs. $M = .04$; $F(1,371) = 5.55$, $p < .05$; $d = .16$, $OR = 1.34$). The right panel of Fig. 2 shows that secondborns agreed with the firstborns, as they reported to be less mastery-oriented ($M = -.09$ vs. $M = .17$; $F(1,371) = 13.93$, $p < .001$; $d = .36$, $OR = 1.92$) and more performance-oriented ($M = .12$ vs. $M = -.06$; $F(1,371) = 6.85$, $p < .01$; $d = .21$, $OR = 1.46$) than their firstborn siblings. The size of the sibling age difference was unrelated to the sibling difference in mastery or performance goal pursuit, suggesting that the effects observed are not driven by age differences: $F(1,371) = .87$, $p = .35$ for mastery goals, and $F(1,371) = .004$, $p = .95$ for performance goals.

4. Discussion

Using different analytic approaches, we show that birth order lies at the heart of people's goal preferences as we found consistent support for firstborns' preferences for mastery goals, whereas secondborns preferred performance goals. These results are in line with the notion that, presumably due to a differential treatment by their parents during early childhood, firstborns prefer self-referenced standards to evaluate their competence. That is, they approach tasks with the desire to develop knowledge, skills, and task mastery. On the other hand, secondborns tend to evaluate their competence in terms of other-referenced standards. They are more strongly inclined to approach tasks with the desire to demonstrate competence relative to others. Taking into account Sulloway's (2007) call for the investigation of alternative explanations in birth order research, the replication of our across-family results by a within-family analysis provides evidence that alternative explanations such as uncontrolled between-family differences (Rodgers et al., 2000) are probably not a major threat to our conclusions. Moreover, as the magnitude of the effect sizes was similar in the across- and within-family analyses, this provides further support for the validity of across-family studies (see also

[2] It has been suggested to report odds ratios in birth order research, to facilitate the acknowledgment of the strength of birth order in determining behavioral phenomena (Sulloway, 2001). We converted the effect sizes into odds ratios, using the formula put forward by Chinn (2000). She explained that Cohen's d can be calculated by dividing $\ln(OR)$ by 1.81. Converting this formula led us to the following: $OR = \exp(d \times 1.81)$.

Kristensen & Bjerkedal, 2007). This bodes well for early findings in birth order research that have often relied on across-family designs for assessing birth order effects, but have been criticized in later years (Rodgers et al., 2000).

Our results extend and refine previous research by relating birth order to achievement strivings. In previous birth order research, achievement-related behaviors have typically been grouped together under the broad personality dimension of "conscientiousness" (Healey & Ellis, 2007; Paulhus et al., 1999; Sulloway, 2001). Our findings suggest that a more fine-grained framework of achievement-related behaviors should be used to analyze this relationship, as achievement strivings may involve different personal goals that were found to be differentially affected by birth order. Our findings also contribute to AGT, as they go beyond the current focus on proximal, psychological antecedents of achievement goals (e.g., Elliot, 2005), and provide further evidence for more fundamental antecedents of achievement goal preferences (cf. Murayama et al., 2011). Future research could examine genetic-environment correlates of achievement goals, and, for instance, investigate the interactive effect of genetic factors and birth order on achievement goal preference.

Another potential avenue for future research is the investigation of the underlying mechanisms on which we relied to develop our hypotheses. For instance, it should be tested whether in early childhood, firstborns are primarily evaluated by their parents on the basis of self-referenced standards. Also, future research should examine whether the same findings emerge in other competence-relevant situations, such as the workplace and the ball field. Finally, for our within-family analyses, we relied on participants' ratings of sibling's goal preference to obtain firstborn and secondborn scores within each family. Future research should examine whether the effects hold when the siblings themselves rate their own goal preference.

In conclusion, this study shows that folk psychology stories about different sibling upbringings leading to different life choices may be right after all. Firstborns may be more motivated to learn, whereas secondborns may be more motivated to win. Thus, this might also explain why British politician Ed Miliband overtook his brother's political leadership so dramatically; it may have been his ultimate goal since childhood.

Acknowledgments

We would like to thank Frank Sulloway, Wouter Duyck, Filip Lievens, and an anonymous reviewer for their useful comments on earlier versions of this paper. This research was supported by a PhD research grant from the Fund for Scientific Research – Flanders (FWO).

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