Developmental Study on Leg-to-Body Ratio Preferences

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Abstract

Few studies have tested developmental differences in the perception of human body attractiveness and none have investigated development of Leg-to-Body Ratio (LBR) preferences. The aim of the current study was to determine whether preferences for LBR are largely innate and present among children in their early childhood, acquired in the course of socialization, and/or triggered by biological and hormonal changes. The study included 450 Polish men and women from Lower Silesia and Opole Province, Poland, whose ages ranged from 3 to 20 years. Participants were asked to choose which figurine they found the most attractive from a set of male and female figurines of various LBRs. We found that children below 8 years of age did not prefer any particular LBR and starting from about 9 years of age, preferences towards the legs of average length emerged. Importantly, an LBR higher than the population average was not perceived as the most attractive until the age of 15 years. Therefore, we have empirically confirmed that LBR preferences change during development.

Key words: body image, Leg-to-Body Ratio (LBR), anthropometrics, development, developmental changes, attractiveness

Introduction

Scientists have been studying beauty ideals and physical attractiveness for several decades. Numerous studies suggest that beauty of the human body is related to morphological traits such as facial attractiveness1, height2, weight3, body shape4, hair5 or eye color6. Beauty ideals have been tested both in homosexual and heterosexual males and females7 and in traditional societies8,9.

Attractiveness preferences have been linked to theories of evolutionary adaptation and social learning10–14. Despite the fact that infants have developed body representation15–19, little is known about developmental changes in the perception of physical attractiveness. To date, there exist only a few developmental studies on attractiveness preferences. The majority of those studies investigated solely a discrepancy between perception of people’s own bodies and their body ideals in young adulthood20–22, or focused on changes in preferences during puberty23. At the same time, only a few studies addressed attractiveness preferences among people in their early childhood24. To supplement the current body of knowledge on changes in attractiveness preferences during human development, we conducted a study that examined preferences for Leg-to-Body Ratio (LBR) in a large sample of people aged 3–20.

A perceived erotic quality of the legs was discovered a long time ago, but until recently no attempts have been made to investigate that phenomenon experimentally. Most recent research indicates that leg length influences perceived attractiveness. Studies have shown that the average or slightly higher than the average LBR positively affects perceptions of women’s attractiveness25–30. This effect was noted even when the stimuli were assessed by other women28. In the case of men, the results reported by previous work are more ambiguous. In a study by Swami, Einon and Furnham31, the stimulus silhouette with the lowest LBR was preferred by participants. However, in other studies29,32, slightly higher than average or average LBR was preferred in men. Generally, legs influence women’s sexual attractiveness more than men’s sexual attractiveness. In a study by Montoya33, legs were more important in men’s evaluation of women’s overall body attractiveness (ranked 3rd of 21 physical characteristics...
assessed by men) than in women’s evaluation of men’s attractiveness (ranked 16th of 21 physical characteristics assessed by women).

The attractiveness of LBR may be influenced by both cultural and biological factors. There is evidence that leg length attractiveness is associated with cultural variables34. Analysis of attractive human shapes in works of art over many centuries35 suggests that the ideal LBR of women but not of men has increased over time, as modern attractive women have significantly longer legs than did attractive antecedents. This may be the result of cultural influences on beauty standards associated with LBR35–37, because beauty ideals surrounding long legs are strongly and positively enforced in Western culture36–38. This line of thinking was confirmed in a cross-cultural study, in which data from twenty-seven nations39, indicated that LBR preferences across different countries were only slightly modified by the participants’ origin. Moreover, among the traditional Himba tribe who are relatively isolated from Western culture, participants perceived relatively high LBR as an indicator of attractiveness for men, but not for women39. Thus, patterns of attractiveness seem to be formed by specific cultural and environmental influences.

On the other hand, LBR is also an honest signal of mate value and genetic quality, and may be related to both sexual and natural selection. First, leg length is an essential predictor of health status40,41 and physical capability42, which were prerequisites of survival among humans throughout our evolutionary history. It is generally acknowledged that shorter legs might be an indicator of early childhood adverse environmental influences on a child’s development, such as malnutrition or illness43,44. Long legs are also related to heat dissipation, which may be directly related to an infant’s growth because it impacts milk production45. Taken together, attractiveness might also be explained in adaptive, evolutionary terms (which is not contrary to cultural or developmental diversity)23.

Interestingly, only a few studies have tested developmental differences in the perceived attractiveness of the human body. Connolly, Slaughter and Mealey24 provided 6- to 17-year-olds with line drawings of 12 female and 12 male bodies that varied in width (under, average, over) and Waist-to-Hip Ratio (WHR; ranged from 0.7 to 1.0). Children were asked to choose the most attractive figure from each set. Results showed that 6-year-olds had no WHR preferences. By age 10, a preference for higher male WHRs emerged, followed by a preference for lower female WHRs between the ages of 12 and 15. These results indicate that hormonal changes may draw children’s attention to these cues, while at the same time, may be shaped by cultural norms. It is also possible that body attractiveness ratings change with development as a function of children’s own changing body shapes37. In a further study38, participants whose ages ranged from 4 to 26 years viewed sets of pictures presenting female bodies that varied systematically on the dimension of width. Participants ranked three sets according to their perception of body normality, and ranked the other three sets in terms of body attractiveness. Results indicated that, already from the youngest age group, silhouettes representing significantly thinner than average body widths were assessed as the most attractive.

The current study investigates the development of LBR preferences. Because LBR is a mating-relevant cue25–29, we assess developmental trends in relation to what we know about WHR preferences, and test children under adrenarche (aged 3–8), peripubertal children (aged 9–14) and adolescents/young adults (aged 15–20). Because our study is the first of its kind, we could not hypothesize about the possible outcomes.

**Materials and Methods**

**Participants**

The study included 450 participants (234 females and 216 males) whose ages ranged from 3 to 20 years (M=12.44, SD=4.05 for females and M=13.11, SD=3.91 for males) (see Table 1). All participants were Caucasian. The study was conducted in kindergarten classes, primary schools, and secondary schools from Lower Silesia and Opole Province, Poland. The oldest participants were students at the University of Wroclaw and the University of Economics in Wroclaw. Informed consent was obtained from parents of younger children prior to testing, and only the children who gave their oral consent were invited to participate. Children’s or parent’s refusal rate in the kindergarten classes was about 20%, and extremely rare among older children and adults.

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Materials and Measures

Three-dimensional male and female figurines were used as stimuli (for example, see: Figure 1). Each figurine was 17 cm tall and had natural skin and hair colour. The figurines were anatomically detailed and naked. The LBR of the average figurine (.51) was similar to the average LBR of the studied population. It was shown in previous anthropometric research that men’s legs are generally longer than are women’s, but these differences were too small to reflect them during stimulus construction (the difference would equal 1.5 mm for a 17 cm tall figurine). Therefore, leg length of male and female figurines was equal. The creation of the variable figurines involved modification of the average (i.e., template) figurine — elongation of legs at the cost of shortening the trunk. In this study, we used 5 male and 5 female stimuli (the original figurine with LBR=,51, figurines with legs elongated by 7.5% and 15%, and figurines with legs shortened by 7.5% and 15%). LBR was calculated as anthropometric measure from perineum to sole (photographs of the stimuli can be obtained upon request from the authors).

Procedure

Participants were first given five female figurines and were able to compare them. Following this, participants were asked to choose the most attractive figurine. We used the sentence, „która ci się najbardziej podoba?“ in Polish, which translates roughly in English to: which one do you like most/which one is the most attractive or beautiful? Attractiveness was measured by the choices made by the participants. The same procedure was repeated using five male figurines. Thus, each participant was asked to make the choice twice, once for female figurine and once for male figurine.

Researchers made sure that the phrase used to assess attractiveness in the youngest group was understandable for children aged 3–8. We did not literally ask, „Which figurine is the most attractive?“, due to the children’s difficulties in understanding the highly abstractive term of „attractiveness“. To avoid participant’s random choices, younger children were also asked to choose a figurine after a longer time – first they could touch the figurines, manipulate with them, etc. The children were not forced to make a quick decision, and some selected the figurine they preferred after 5–10 minutes.

We also tested children’s ability to notice the differences between the figurines. Participants were asked to indicate which figurine had the longest legs and which had the shortest legs. All children were able to point out the differences between the figurines’ leg lengths.

Statistical analysis

To test the hypothesis that LBR preferences are acquired during development, and to assess the effect of participant’s age and gender on LBR preferences, we performed Multivariate Analyses of Variance (MANOVAs) with repeated measures for female and male LBR, using IMB SPSS 21.0 software. The model consisted of three independent variables: participant’s sex, participant’s age, and the figurine’s sex as a within-subject factor. This resulted in a 2 (participant’s gender: female vs. male) x 3 (participant’s age: under adrenarche vs. pubertal vs. adolescent/adult) x 2 (figurine’s sex: male vs. female) experimental design. The dependent variable was preference for LBR, and was measured on the 1–5 scale, where 1 represented the figurine with average LBR decreased by 15%, 2 – average LBR decreased by 7.5%, 3 – average LBR, 4 – average LBR increased by 7.5%, and 5 – average LBR increased by 15%.

Results

As a first step we divided participants into three groups according to their developmental stage. The first group (N=126) included children under adrenarche (3–8), the second group (N=119) included children in pubertal age (9–14), and the third group (N=205) included 15 to 20 year-olds (15–20).

Tests of within-subject factor effects indicated no main effect of the figurine’s sex on LBR preferences, F(1, 444)=0.65, p>0.05, η²=0.001. There were no significant interaction effects of the figurine’s sex on any of the between-subject factors (p>0.05). Therefore, figurine’s sex had no significant influence on LBR preferences.

We found no main effect of the participant’s sex on LBR preferences, F(1, 444)=0.02, p>0.05, η²<0.001. However, we found a main effect of the participants’ age on LBR preferences, F(1, 444)=14.86, p<0.001, η²=0.063. In the group aged 3–8, preferences for female LBR averaged 3.05 (SD=1.43). In the group aged 9–14, preferences for female LBR averaged 2.99 (SD=1.27) and preferences for male LBR averaged 3.13 (SD=1.21). In the oldest group consisting of people aged 15–20 years, preferences for female LBR averaged 3.57 (SD=1.04) and preferences for male LBR averaged 3.05 (SD=1.43) (see Figures 2 and 3).
Post hoc testing, using Bonferroni correction, revealed that there were no significant differences between the youngest and middle groups in LBR preferences (p>0.05), however the oldest group preferred significantly higher LBR than did the remaining two groups (p<0.05).

Discussion

The present study demonstrated that children below the age of 8 years did not exhibit any LBR preferences and appeared to make their choice without showing any specific pattern. Starting from the age of about 9 years, more apparent preferences towards the legs of average length were shown. Among participants of the oldest group (15–20 years) preferences towards a figurine of LBR +7.5% emerged (see Figures 4 and 5).

Our results support the hypothesis that LBR attractiveness patterns are acquired during development. Probably the earliest explicit preferences for the average LBR can be related to experience with examples of such proportions in a population. Further changes in preferences (emergence of preferences for the figurine of LBR +7.5%) might be associated with cultural values. Sociocultural models for preadolescent children suggest, for example, that the ‘thin ideal’ is transmitted and reinforced via a number of different mechanisms of primary and second-
ary socialization: parents, peers and the media. Television impact can be observed already among 6 years old girls, as even by this age they consider a thinner than average figure an ideal. However, the most significant changes in preferences seem to appear during pubertal body transformation, when girls become sensitive to social and cultural norms of the ideal body. In the case of leg length preferences, television is of particular importance. McCabe & Ricciardelli stated that television is of particular importance for forming leg length preferences because of frequent presentation of tall models with very long legs. What is more, even television programs for young girls, such as cartoons, present unrealistic heroines with exaggerated female characteristics (e.g., extremely long legs).

However, there is also a biological explanation for the development of attractiveness perception related to the effect of hormones on children in puberty. It is essential to notice that puberty is a period when activity of gonadal steroids begins. Steroid hormones are responsible for sexual reproduction and organization of the nervous system. At this time, first visual signs of sexual maturity appear, such as developing breasts and facial hair; most importantly, it is possible that steroid hormones affect the process of organizing sexual preferences. Thus, changes in preferences, especially concerning longer legs, may result from increased activity of steroid hormones, organizing teenagers’ preferences towards more sexual shapes. Preferences towards LBR might then develop as a result of both cultural and biological factors. Hormone exposure during the pubertal period may shape greater awareness of the human body in the teenage years, thereby making teens more prone to diverse cultural influences.

In summary, we found that young children did not prefer any particular LBR, and that pubertal children preferred legs of average length. Starting from the age of 15 years, LBR higher than the average was assessed as the most attractive. Therefore, contrary to e.g., assessments of facial attractiveness, LBR preferences change during human development. However, at this stage of research it is hard to determine whether the mechanism responsible for these changes has a social and/or biological basis.

Acknowledgements

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Izgleda da su empirijski potvrdili da se sklonosti prema LB vrlo rano, gdje se začinju da se razvijaju. Stoga se spremaju za stvarnu prakstu u razvoju. U studiji je sudjelovalo 450 ljudi iz Poljske u provincijama Cerkvenog i Bačko, u čime je stavljen na poziciju da se u ranom dobi (20 godina) istražuju razlozi za razvoj izbora nogu i tijela. Ovo je utvrdjeno da se ovaj izbor mijenja tijekom razvoja, a i zbog bioloških i hormonalnih promjena. U studiji je sudjelovalo 450 ljudi iz Poljske u provincijama Cerkvenog i Bačko, u čime je stavljen na poziciju da se u ranom dobi (20 godina) istražuju razlozi za razvoj izbora nogu i tijela. Ovo je utvrdjeno da se ovaj izbor mijenja tijekom razvoja, a i zbog bioloških i hormonalnih promjena.

Razvojna studija o sklonosti prema omjeru nogu i tijela

Sažetak

Samo nekoliko studija je testiralo razvojne razlike u percepciji privlačnosti ljudskog tijela, a i jedna dosada nije istraživala razvoj sklonosti prema omjeru nogu i tijela (LBR). Cilj ovog rada bila je utvrditi da li je sklonost LBR-u prirodna i prisutna među djecom u ranom djetinjstvu, ili se već stječe tijekom socijalizacije, i 2/3 zbog bioloških i hormonalnih promjena. U studiji je sudjelovalo 450 ljudi iz Poljske u provincijama Cerkvenog i Bačko, a razlozi za razvoj izbora nogu i tijela. Uvjetno je da je djeca ispod dobi od 8 godina nisu pokazivale sklonost prema određenom tipu LBR-a, a od oko 9 godina nastaje sklonost prema nogama prosječne duljine. Važno je da iznadprosječni LBR se nije percipirao kao najattractiveiji na dobi od 15 godina. Stoga smo empirijski potvrđili da se sklonosti prema LBR-u mijenaju tijekom razvoja.