Evolution and Human Behavior 33 (2012) 551–556

Original Article

Male facial width is associated with death by contact violence: narrow-faced males are more likely to die from contact violence

Michael Stirrat[a,*], Gert Stulp[b], Thomas V. Pollet[c]

[a]Perception Lab, School of Psychology, University of St. Andrews, UK
[b]Social Psychology, University of Groningen, the Netherlands & Behavioural Biology, University of Groningen, the Netherlands
[c]Social Psychology, University of Groningen, the Netherlands & Social and Organizational Psychology, VU University Amsterdam, the Netherlands

Initial receipt 22 July 2011; final revision received 5 February 2012

Abstract

Male facial width-to-height ratio (bizygomatic width scaled for face height) is a testosterone-linked trait predictive of reactive aggression, exploitative behavior, cheating, deception, and dominance. We tested whether facial width was systematically related to cause of death in a forensic sample. We hypothesized that wider-faced males, being more aggressive and robust, would be less likely than narrower-faced males to die from contact violence (stabbed, strangled, or bludgeoned to death) compared with other forms of homicide. We tested this hypothesis in a forensic data sample covering 523 male and 339 female skeletons. In these data, men with narrower faces were more likely to have died as a consequence of homicides involving direct physical contact than men with wider faces. No such effect was found for women. This effect was found when considering all causes of mortality and when limiting the sample to homicides. This finding suggests that wider-faced males are less likely to die from male–male physical violence, perhaps because of their formidability. Our findings are discussed with reference to the previous literature indicating that facial width-to-height ratio is a marker for male dominance.

Keywords: Face; Sexual selection; Bizygomatic width; Facial width-to-height ratio; Aggression; Formidability; Fighting ability; Dominance

1. Introduction

Ratings of male facial dominance from photographs accurately predict fighting ability (Sell et al., 2009). Facial dominance can also be predictive of life history. For example, the facial dominance of West Point US Military cadets in the 1950s predicted their final military rank as well as the number of children that they would sire (Mueller & Mazur, 1996). Typical features of facial dominance, associated with perceived lack of warmth, lack of honesty, and lack of cooperation, have been masculinity (Perrett et al., 1998) and prominent cheekbones (Cunningham, Barbee, & Pike, 1990).

Recently, relationships have been found between male dominance, reactive aggression, and variation in cheekbone measurements. Variation in human male bone growth, specifically cranial growth, is related to testosterone effects in adolescence (Verdonck, Gaethofs, Carels, & de Zegher, 1999), and studies have shown that male bone growth across the zygomatic arches (bizygomatic width), measured as the ratio of facial width to height, is related to perceptions of aggression and exploitativeness (Carre, McCormick, & Mondloch, 2009; Carre, Morrissey, Mondloch, & McCormick, 2010; Stirrat & Perrett, 2010). This measure also predicts actual aggression (Carre & McCormick, 2008, but see Özener, in press), cheating and deception (Haselhuhn & Wong, 2011), and exploitation of others (Stirrat & Perrett, 2010) in competitive and economic contexts, as well as increased self-reported ability to win "a physical fight with a same sex peer".

Fighting ability, or strength, also predicts a man's willingness to express anger towards others (Sell, Tooby, & Cosmides, 2009) and is therefore also likely to predict violence. Indeed, male facial width has been positively associated with measures of actual physical violence: in one study, !Kung San Bushmen with broader bizygomatic measures had been more often involved in violent interactions resulting in head scars than those men with

* Corresponding author.
E-mail address: michael@perceptionlab.com (M. Stirrat).

1090-5138/$ – see front matter
doi:10.1016/j.evolhumbehav.2012.02.002

narrower bizygomatic width (Christiansen & Winkler, 1992). The authors interpreted the head scars as a measure of willingness to engage in violent fights because, amongst other measures, testosterone measures were positively associated with the number of scars in these violent men.

Signaling dominance and deciphering signals of dominance appear to have evolved in several nonhuman species [e.g., Harris sparrows (Rohwer, 1975)] to reduce the costs of competing over dominance. Accurately assessing a rival and avoiding a fight are likely to be less costly than losing a fight with a severe injury (Dawkins & Krebs, 1978). Signals of dominance may evolve in conditions where the cost of fighting (e.g., death) is greater than the benefit of the resource that is fought over (Maynard Smith & Harper, 1988)—although recent models suggest that signaling may be stable even over very high value resources and low costs of conflict where there are also high levels of commitment to defending that resource (see Szamado, 2011). As it has been found in a number of small-scale human societies that up to a third of men die as a result of violent encounters (Keeley, 1996), we might therefore expect that a cue to physical dominance such as facial width-to-height ratio would be a relevant parameter in human evolution. Given the foregoing comments about associations between facial width and anger (Sell, Tooby et al., 2009), violence (Christiansen & Winkler, 1992), and dominance (Mueller & Mazur, 1996), it would seem likely that wider-faced men are more willing to enter aggressive encounters and that they will do so because they are more likely to survive such encounters.

We therefore set out to test whether wider-faced men are more likely to survive aggressive encounters. We predicted that men who die from physically violent encounters, such as beating, strangulation, blunt force trauma, or stabbing, are likely to have a narrower facial width-to-height ratio when compared with those who die from technological causes such as poisoning or gunshot wounds, which would not favor men with either wide or narrow faces. We tested this hypothesis in a forensic anthropology data set (Jantz & Moore-Jansen, 2006). This database has detailed measurements of skeletal remains associated with cause of and age at death. We predicted that the skeletal remains of male homicide victims, who died from contact violence, would have narrower facial width-to-height ratios than those who died from other causes. More importantly, within homicide victims, we predicted that those who died from contact violence would have a lower relative facial width-to-height ratio than those who died from other causes of homicide (such as gunshot wounds). Even if wider-faced males are more likely to engage in aggressive encounters, we predicted them to be better able to survive direct physical confrontations but not better able to survive more indirect forms of violence. We also predicted that there would be no such relationship between female facial width-to-height ratio and cause of death.

2. Methods

2.1. Data

We used data from a database of forensic anthropology in the United States (Jantz & Moore-Jansen, 2006). This set contains detailed forensic data on 1514 skeletons. This collection aimed to represent different ethnic and socioeconomic groups from different regions across the United States. The data contain skeletons from diverse sources including (forensic) anthropology departments, the National Museum of Natural History, the Medical Examiner's Office, and various other sources. A full description of the various sources can be found in the codebook (Jantz & Moore-Jansen, 2006). While this sample is not representative for the US population, the study aimed to cover a wide range of socioeconomic groups from various regions. For our analyses, we only used adult skeletons (estimated to be 18 years or older; N=1143) and skeletons where all measures were present (N=1148), which limited our analyses to 523 male skeletons and 339 female skeletons (N=862, 56.9% of the data set).

2.2. Measures

All deaths in the data were coded as homicide or other cause of death and, amongst the homicides, the manner of homicide. We coded as contact violence all cases where the victim was beaten to death (with or without the use of an object), strangled, or stabbed. The vast majority of 'other homicides' involved gunshot wounds (around 35% for females and around 50% for males), but this category also included homicides where the cause was listed as unknown (both <1%) or not coded (males: 45%; females: 35%). We reran analyses excluding those who were not coded and also report the estimates for these.

Ethnicity of the skeleton was coded as White or non-White. Skeletons coded as non-White consisted predominantly of African Americans (78%). Further division of non-Whites into African Americans and 'other' would have left us with too few cases for analysis.

The event history analyses we performed used a time variable: 'age at death'. For 70% of the male and 80% of female skeletons, age at death was accurately known. For the remainder of cases, we imputed age at death based on the average estimate of the upper and lower age at death made by the forensic anthropologist(s). In certain cases, only one estimate was given, the lower estimate, and we used this value (5.9% of males; 4.4% of females). However, restricting the analyses to only accurate estimates leads to similar effects as those reported below for every analysis. Similarly, rerunning the analyses below with either the upper or lower estimates of age at death, instead of the average estimate, leads to similar parameter estimates as those reported below.

Our key independent variable is bizygomatic width scaled for facial height (facial width-to-height ratio). Scaling bizygomatic width for upper face height allows ruling out that effects found are merely due to overall size. Results reported are similar when bizygomatic width and upper facial height are entered independently (see Supplementary Fig. S1, available on the journal's website at www.ehbonline.org). We preferred the ratio measure (which was normally distributed) as our prediction is about relative size. In addition, upper face height and bizygomatic width are correlated (r=.494; p<.0001), and adding them independently could lead to problems with multicollinearity.

The descriptive statistics for the sample can be found in Table 1.

2.3. Statistics

Data were analyzed by use of independent-sample t tests and logistic regressions (Menard, 2002). In addition, we performed event history analysis by use of Cox regression models, also known as the proportional hazard models (Lee & Wang, 2003). This technique allows us to test if, over time, narrow-faced individuals were significantly more likely to die from contact violence than were wide-faced individuals. Cox regression makes relatively few assumptions compared to other statistical techniques, but a key one which we tested is the proportional hazard assumption: the likelihood of an event should be independent of the key predictor variable over time. In none of the cases could the model be improved by adding a time-dependent covariate. This suggests that the proportional hazards assumption can be maintained. For the Cox regression models, we first constructed a model with just facial width-to-height ratio and subsequently checked if the model could be improved by including ethnicity (White/Non-white). For the Cox regression models, we report the parameter estimates, standard errors, Wald statistics, and the hazard ratios.

We will first present models testing the interaction between sex and facial width-to-height ratio (standardized for each sex). Subsequently, we separated our analyses for men and women. For the logistic regression models and Cox regression models within each sex, we standardized facial width-to-height ratio, which facilitates comparisons between the coefficients and is more easily interpretable. Rerunning the analyses with facial width-to-height ratio standardized within both sex and ethnic group leads to similar estimates (up to the second decimal) to those presented below. For graphical illustration, we will use tertiles to display the relationship between relative facial width-to-height ratio and the likelihood of dying a contact violence death.

All analyses were performed in SPSS 16.0.

Table 1
Descriptive statistics for the sample (frequencies or means and S.D.)

		Males (n=523)	Females (n=339)
Ethnicity	White	282	189
	Non-White	241	150
Cause of death	Other	403	242
	Homicide: contact violence	26	31
	Homicide: other (incl. uncoded)	94	66
Facial width-to-height ratio		1.824 (0.11)	1.821 (0.11)
Lower age estimate		37.56 (15.19)	33.09 (14.19)
Upper age estimate		39.94 (16.02)	34.09 (14.16)
Average age estimate (or lowest in case of upper age missing)		38.79 (15.25)	33.63 (14.17)

3. Results

The descriptive statistics for the sample can be found in Table 1.

Although facial width-to-height ratio has previously been found to differ between the sexes (Weston, Friday, & Lio, 2007), males in this sample did not have a larger mean facial width-to-height ratio than females [M=.0032; S.E.=.008; t(860)=.379; p=.705].

3.1. Death by contact violence versus other causes of death

Overall, women were more likely than men to die from contact violence compared to other causes of death [9.1% versus 5.0%; χ^2(1)=5.801; p=.016].

A logistic regression revealed a significant interaction between sex and facial width-to-height ratio [B=0.695± 0.285; Wald test=5.953; p=.015; exp(B)=2.00]. This indicates that the association between facial width-to-height ratio and the likelihood of dying from contact violence is different for men and women (Fig. 1). Therefore, we analyzed this pattern within each sex.

In males, logistic regression showed that wider-faced males were significantly less likely to die from contact violence (compared to other causes of death; Fig. 1A) than were narrow-faced males [B=−.541±.216; Wald test=6.284; p=.012; exp(B)=.582]. A decrease of a standard deviation in male facial width-to-height ratio increased the odds of dying a death by contact violence by a factor of 1.72 (1/.582). A man with an average facial width-to-height was predicted to have a 4.4% chance of dying a contact violence death. An increase of one standard deviation in this ratio decreases this chance to 2.6%. Ethnicity did not prove to be a significant predictor of the likelihood of dying a contact violence death (Wald test=.376; p=.540). Similarly, limiting the sample to only cases where the cause of death was not missing did not alter the size of this association between facial width-to-height ratio and dying as a consequence of contact violence [exp(B)=.571; 95% confidence interval (CI)=.355–.917].

For females, a positive but nonsignificant relationship was found between facial width-to-height ratio and the likelihood of dying from contact violence [logistic regression: B=.154±.186; Wald test=.687; p=.407; exp(B)=1.17; Fig. 1A]. Again, ethnicity had no effect on this likelihood (Wald test=.475; p=.491).

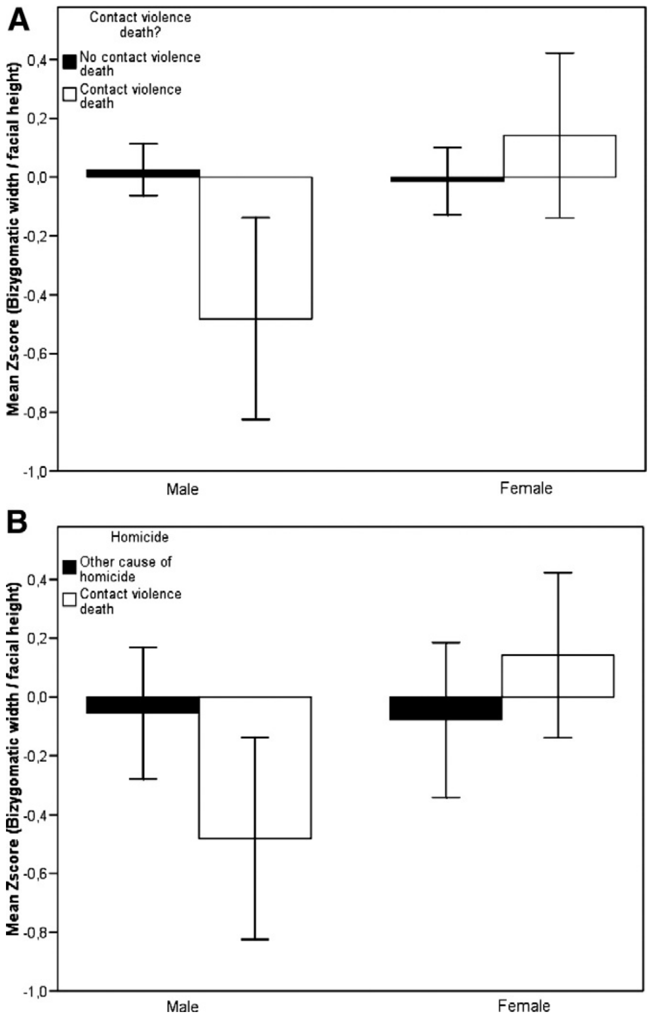

Fig. 1. (A) Mean facial width-to-height ratio for contact violence deaths versus other causes of death. Means are standardized within sex. Bars represent 95% CI. (B) Mean facial width-to-height ratio for contact violence deaths versus other causes of homicide. Means are standardized within sex. Bars represent 95% CI.

Results from the event history analyses by Cox regression mirrored those of the logistic regressions. Again, a significant interaction between sex and facial width-to-height ratio was found [B=−.638±.272; Wald=5.510; p=.019; exp(B)=.528]. Facial width-to-height ratio significantly predicted the likelihood of dying by contact violence over time for men but not for women [men: B=−.574±.205; Wald=7.877; exp(B)=.563; p=.005; women: B=.077±.179; Wald=.186; p=.666; exp(B)=1.08]. Neither the Cox regression model for males nor the model for females could be improved by including ethnicity (both Wald tests<.4; all p>.5). Over time, men who were wider faced were significantly less likely to die from contact violence: the hazard ratio for a violent death (versus a different cause) decreases by a factor of 1.78 (1/.563) with an increase of one standard deviation in facial width-to-height ratio. In contrast, for women, facial width-to-height ratio is not associated with the risk of dying from contact violence. Fig. 2A shows the results for males where we divided the facial width-to-height into tertiles for graphical representation. The graphical representation suggests that the widest faced males (upper tertile) run a very low risk of death associated with contact violence. This suggests that a logarithmic transformation of facial width-to-height ratio could be a better fit to the data. However, this transformation of facial width-to-height ratio did not prove a better fit to the data (Δ−2LL<1). Rerunning the Cox regression analysis for males excluding cases where the cause of death was not listed led to similar results [exp(B)=.455; 95% CI=.289–.716].

3.2. Death by contact violence versus other homicides

Women were more likely than men to die from contact violence compared to other types of homicide, but the

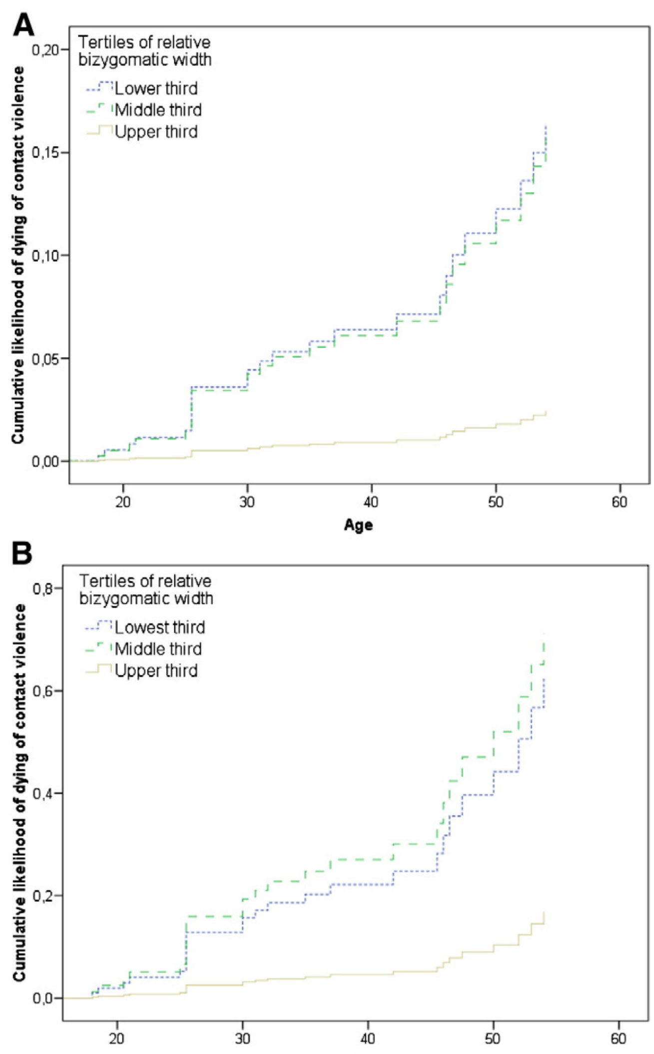

Fig. 2. (A) Cumulative likelihood of dying from contact violence by tertile of facial width-to-height ratio for males (all causes of death). (B) Cumulative likelihood of dying from contact violence by tertile of facial width-to-height ratio for males (only homicides considered).

difference was marginally significant [32.0% versus 21.7%; $\chi^2(1)=2.934$; $p=.087$].

When only considering homicides as causes of death, we again found a significant interaction between sex and facial width-to-height ratio on the likelihood of dying as a consequence of contact violence as compared to other forms of homicide [$B=-.646\pm.322$; Wald=4.034 $p=.045$; exp(B)=.524]. For males, a logistic regression revealed that narrow-faced men tended to be more likely than wide-faced males to die as a consequence of contact violence compared to other forms of homicide [$B=-.416\pm.230$; Wald test=3.265; $p=.071$; exp(B)=.659; Fig. 2A]. A decrease of a standard deviation in male facial width-to-height ratio increased the odds of dying a death by contact violence by a factor of 1.52 (1/0.659). A man with an average facial width-to-height had a 19.8% chance of dying as a consequence of contact violence compared to other forms of homicide. An increase of one standard deviation in this ratio decreases this chance to 14.0%. Ethnicity did not predict the likelihood of dying as a consequence of contact violence for males (Wald test=.201; $p=.654$). Excluding cases where the cause of homicide is not listed did not alter the size of this association between male facial width-to-height ratio and dying as a consequence of contact violence [exp(B)=.719; 95% CI=.435–1.189].

Similar to the results for all causes of death, a positive but nonsignificant relationship was found between facial width-to-height ratio and the likelihood of dying from contact violence in women [logistic regression: $B=.230\pm.224$; Wald test=1.047; $p=.306$; exp(B)=1.26; Fig. 1B]. As in previous analyses, ethnicity had no effect (Wald test=.070; $p=.791$).

Event history analysis by Cox regression showed a statistical trend for an interaction between facial width-to-height ratio and sex [$B=.479\pm.290$; Wald=2.727; $p=.099$; exp(B)=.619]. Cox regression within each sex showed that relative width-to-height ratio significantly predicted the likelihood of dying by contact violence for men but not for women [men: $B=-.500\pm.218$; Wald=5.264; $p=.022$; exp(B)=.607; women: $B=-.019\pm.189$; Wald=.010; $p=.922$; exp(B)=.982]. Neither the Cox regression model for males nor the model for females could be improved by including ethnicity (both Wald tests<.7; both $p>.4$). Compared to other causes of homicide (e.g., being shot or poisoned), men who were wider faced were significantly less likely to die from contact violence over time (Fig. 2B). For males, the hazard ratio for dying from contact violence (versus different types of homicide) decreases by a factor of 1.65 with an increase of one standard deviation in facial width-to-height ratio. In contrast, for women, facial width-to-height ratio was not associated with the risk of dying from contact violence. As was found for all causes of death, Fig. 2B suggests that the widest-faced males (upper third) especially run a very low risk of a homicide by contact violence compared to a homicide of a different form. Again, a logarithmic transformation of facial width-to-height ratio did not prove a better fit to the data ($\Delta-2LL<1$). Rerunning the model for males, excluding cases where the cause of homicide was not listed led to similar results [$B=-.484$; Wald=4.744; exp(B)=.616; $p=.029$].

4. Discussion

In line with our predictions, we found that narrow-faced men in this sample were more likely than wider-faced men to die by contact violence compared with other causes of death or homicide. This was the case even though we might expect wider-faced men to get into more fights. Also in line with our predictions, there was no evidence of an association between dying from contact violence and facial width-to-height ratio in women. Our results suggest that facial width-to-height ratio is a valid indicator of male fighting ability inasmuch as men with high facial width-to-height ratio appear less likely to die from contact violence. This finding fits well with research showing that facial width-to-height ratio is a cue to physical dominance (Carre et al., 2009; Stirrat & Perrett, 2010) and that facial features relate to formidability (Sell, Cosmides et al., 2009). It also lends further support to the idea that facial width-to-height ratio may operate as a signal of physical dominance evolved under sexual selection, specifically intrasexual competition. The evidence presented here suggests that male facial width is related to a severe outcome of intrasexual competition: death. We believe that our research is the first to show a link between facial width and a directly relevant fitness measure.

We might have expected wider-faced men to be overrepresented in deaths by contact violence as they are found to be more predisposed to be aggressive (Carre et al., 2009). The results here, however, suggest that these men are more aggressive because they face less risk in an aggressive encounter. The correlation between number of head scars and bizygomatic width in !Kung San Bushmen found by Christiansen and Winkler (1992) might now be understood as not merely a result of the aggression of men with wider faces but perhaps also as an artifact of the narrow-faced Bushmen not surviving their head wounds.

Our study does have some limitations. First, the analysis is dependent upon the accurate coding of the skeletal remains. Although some remains may be misclassified, it appears unlikely that this would have been systematically biased as a function of relative facial width-to-height ratio (and would have only been so for males). Secondly, while this study supports the notion that facial width-to-height ratio is a useful marker for male intrasexual competition, the study is limited to a sample that was not selected for the purpose and is a nonrepresentative sample of the population. Finally, although most homicidal violence is male–male (Daly & Wilson, 1988) and we assume the same here, we have no data on the perpetrators of these homicides. More rigorous tests of our hypotheses are thus necessary in future research. However, in line with experimental and observational data (Carre & McCormick, 2008; Carre et al., 2009, 2010; Christiansen & Winkler, 1992; Mueller & Mazur, 1996; Sell, Cosmides et al., 2009; Stirrat & Perrett, 2010), the current study does support the notion that facial width-to-height ratio is a useful marker for male intrasexual competition and aggression.

Supplementary Materials

Supplementary data to this article can be found online at doi:10.1016/j.jim.2012.02.002.

Acknowledgments

The authors are grateful to Jantz and Moore-Jansen for making these data publicly available via the ICPSR (doi:10.3886/ICPSR02581). The views presented in this paper are those of the authors and not those of the ICPSR or the original collectors of the data. Thomas Pollet is supported by The Netherlands Organisation for Scientific Research (Veni scheme; 265 451.10.032).

References

Carre, J. M., & McCormick, C. M. (2008). In your face: facial metrics predict aggressive behaviour in the laboratory and in varsity and professional hockey players. *Proceedings of the Royal Society Series B, Biological Sciences*, *275*(1651), 2651–2656, doi:10.1098/rspb.2008.0873.

Carre, J. M., McCormick, C. M., & Mondloch, C. J. (2009). Facial structure is a reliable cue of aggressive behavior. *Psychological Science*, *20*(10), 1194–1198, doi:10.1111/j.1467-9280.2009.02423.x.

Carre, J. M., Morrissey, M. D., Mondloch, C. J., & McCormick, C. M. (2010). Estimating aggression from emotionally neutral faces: which facial cues are diagnostic? *Perception*, *39*(3), 356–377, doi:10.1068/P6543.

Christiansen, K., & Winkler, E. M. (1992). Hormonal, anthropometrical, and behavioral-correlates of physical aggression in Kung-San men of Namibia. *Aggressive Behavior*, *18*(4), 271–280.

Cunningham, M. R., Barbee, A. P., & Pike, C. L. (1990). What do women want—facialmetric assessment of multiple motives in the perception of male facial physical attractiveness. *Journal of Personality and Social Psychology*, *59*(1), 61–72.

Daly, M., & Wilson, M. (1988). *Homicide*. New York: A. de Gruyter.

Dawkins, R., & Krebs, J. R. (1978). Animal signals: information or manipulation? In J. R. Davies, & N. B. Davies (Eds.), *Behavioural ecology: an evolutionary approach* (pp. 282–309). Sunderland, MA: Sinauer Associates.

Haselhuhn, M. P., & Wong, E. M. (2011). Bad to the bone: facial structure predicts unethical behaviour. *Proceedings of the Royal Society Series B*, doi:10.1098/rspb.2011.1193.

Jantz, R. J., & Moore-Jansen, P. H. (2006). Database for forensic anthropology in the United States, 1962–1991: Inter-university Consortium for Political and Social Research (ICPSR) [distributor]; 2006. Retrieved from http://dx.doi.org/10.3886/ICPSR02581.

Keeley, L. H. (1996). *War before civilization*. New York: Oxford University Press.

Lee, E. T., & Wang, J. W. (2003). *Statistical methods for survival data analysis* (3rd ed.). New York: J. Wiley.

Maynard Smith, J., & Harper, D. G. C. (1988). The evolution of aggression—can selection generate variability? *Philosophical Transactions of the Royal Society of London Series B-Biological Sciences*, *319*(1196), 557–570.

Menard, S. W. (2002). *Applied logistic regression analysis* (2nd ed.). Thousand Oaks, CA: Sage Publications.

Mueller, U., & Mazur, A. (1996). Facial dominance of West Point cadets as a predictor of later military rank. *Social Forces*, *74*(3), 823–850.

Özener, B. (in press). Facial width-to-height ratio in a Turkish population is not sexually dimorphic and is unrelated to aggressive behavior. *Evolution and Human Behavior*(0). doi:10.1016/j.evolhumbehav.2011.08.001.

Perrett, D. I., Lee, K. J., Penton-Voak, I., Rowland, D., Yoshikawa, S., Burt, D. M., et al. (1998). Effects of sexual dimorphism on facial attractiveness. *Nature*, *394*(6696), 884–887.

Rohwer, S. (1975). Social significance of avian winter plumage variability. *Evolution*, *29*(4), 593–610.

Sell, A., Cosmides, L., Tooby, J., Sznycer, D., von Rueden, C., & Gurven, M. (2009). Human adaptations for the visual assessment of strength and fighting ability from the body and face. *Proceedings of the Royal Society Series B: Biological Sciences*, *276*, 575–584.

Sell, A., Tooby, J., & Cosmides, L. (2009). Formidability and the logic of human anger. *Proceedings National Academy of Sciences U S A*, *106*(35), 15073–15078, doi:10.1073/pnas.0904312106.

Stirrat, M., & Perrett, D. I. (2010). Valid facial cues to cooperation and trust: male facial width and trustworthiness. *Psychological Science*, *21*(3), 349–354, doi:10.1177/0956797610362647.

Szamado, S. (2011). Long-term commitment promotes honest status signalling. *Animal Behaviour*, 1–8, doi:10.1016/j.anbehav.2011.04.024 in press.

Verdonck, A., Gaethofs, M., Carels, C., & de Zegher, F. (1999). Effect of low-dose testosterone treatment on craniofacial growth in boys with delayed puberty. *European Journal of Orthodontics*, *21*, 137–143.

Weston, E. M., Friday, A. E., & Lio, P. (2007). Biometric evidence that sexual selection has shaped the hominin face. *Public Library of Science ONE*, *2*, 1–8.