Smile Intensity in Photographs Predicts Longevity

Ernest L. Abel and Michael L. Kruger

Psychological Science 2010 21: 542 originally published online 26 February 2010
DOI: 10.1177/0956797610363775

Short Report

Psychological Science
21(4) 542–544

DOI: 10.1177/0956797610363775
http://pss.sagepub.com

Smile Intensity in Photographs Predicts Longevity

Ernest L. Abel and Michael L. Kruger
Wayne State University

Received 7/17/09; Revision accepted 9/9/09

Emotions affect personalities and life outcomes by influencing how people think, behave, and interact with others (Izard, 1971). People with positive emotions are happier and have more stable personalities, more stable marriages, and better cognitive and interpersonal skills than those with negative emotions, throughout the life span (Harker & Keltner, 2001; Hertenstein, Hansel, Butts, & Hile, 2009).

Facial expressions are a barometer of the emotions (Izard, 1971), and like emotions, they vary in form and intensity. Studies by Ekman, Friesen, and their colleagues (e.g., Ekman & Friesen, 1978; Ekman, Levenson, & Friesen, 1983; Levenson, Ekman, & Friesen, 1990) have shown that it is possible to identify different emotional states from facial expressions.

Previous studies have found that positive emotions, as inferred from smile intensity in childhood photos and college yearbook photos, are correlated with marriage stability and satisfaction (Harker & Keltner, 2001; Hertenstein et al., 2009). The present study is the first to link smile intensity to a biological outcome: longevity.

Little information (other than smile intensity) was available regarding the individuals in the previously mentioned photo studies. In the current study, however, we were able to include many additional factors known to influence longevity because of the group we elected to evaluate. We focused on Major League Baseball (MLB) players because detailed statistics are available for each player (dating back prior to 1900), and because MLB players represent a homogeneous occupational group. We (and other researchers) have used this database to examine numerous factors related to longevity (Abel & Kruger, 2005, 2006, 2007; Kalist & Peng, 2007).

Method

Stimuli

Photographs were taken from the *Baseball Register* for 1952 (Spink, Rickart, & Abramovich, 1952). We restricted our analysis to players who debuted prior to 1950, and we included only photographs in which the player appeared to be looking at the viewer. These photographs ($N = 230$) were then enlarged to twice their original size and placed on 3 × 5 file cards.

Procedure

Because of the large number of photographs to be rated, a trichotomous rating scheme for smile intensity (Freese, Meland, & Irwin, 2006) was employed, rather than a more detailed 12-point paradigm (Harker & Keltner, 2001; Hertenstein et al., 2009). The senior author (E.L.A.) and four adults (ages 50–65) coded all 230 photographs after being instructed on how to rate smiles as follows: no smile (1), partial smile (only movement of muscles around the mouth; i.e., only contraction of the zygomatic major muscles; 2), or full (Duchenne) smile (movement of muscles around the mouth and corners of the eyes; i.e., contraction of both zygomatic and orbicularis oculi muscle; 3).[1] Coders were instructed to place each file card into one of the three categories of smile intensity. File cards were shuffled prior to rating so that there were no systematic biases in examining photographs. Only the senior author was aware of the purpose of the study, and he rated smiles without prior information on player longevity.

Ratings were entered into a database; data for death year were updated by Web search for players who died in the years from 2006 through 2009. The modal rating for the five raters was used as the smile intensity score for each player. Cox proportional hazards regression analysis was used to predict longevity, controlling for variables previously found to affect longevity.

The *Baseball Register* (1952) and Lahman (2006) allowed us to control for numerous factors related to longevity, such as year of birth, body mass index (BMI), career length (a reflection of continued physical fitness and performance), career precocity (Abel & Kruger, 2005, 2006, 2007), marital status (Lillard & Panis, 1996), and college attendance (Kalist & Peng, 2007).

Corresponding Author:
Ernest L. Abel, C.S. Mott Center for Human Growth and Development, Wayne State University, 275 East Hancock, Detroit, MI 48201
E-mail: eabel@wayne.edu

Results and Discussion

Data for all variables were available for 196 of the 230 players. Kappa intercoder reliability for these players was .63 ($p < .0001$).

There were 46 players who had not yet died as of June 1, 2009. For those who had died, longevity ranged from an average (standard deviations in parentheses) of 72.9 (13.3) years ($n = 63$) for players with no smiles, to 75.0 (13.2) years ($n = 64$) for players with partial smiles, to 79.9 (11.6) years ($n = 23$) for players with Duchenne smiles.

The first step of the Cox proportional hazards regression model included college attendance, marital status, birth year, career length, age at debut year, and BMI. The overall model was statistically significant, $\chi^2(6, N = 162) = 16.5$, $p = .012$. College attendance resulted in a 44% reduced risk of dying in any particular year ($r = .19$, $p < .01$; hazard ratio, or $HR = 0.56$, $p = .01$). The risk of dying was reduced by an additional 4% for each year of playing baseball ($r = .15$, $p < .05$; $HR = 0.96$, $p = .04$).

In the second step of the model, we examined the effect of smile intensity, controlling for the previously mentioned variables. The model was still statistically significant, $\chi^2(2, N = 162) = 23.7$, $p < .02$). Adding smile ratings led to a significant improvement in predicting mortality, $\chi^2(2, N = 162) = 8.2$, $p < .017$. Players with Duchenne smiles were half as likely to die in any year compared with nonsmilers, $HR = 0.50$, $p = .006$ (see Fig. 1), but Duchenne smilers did not differ significantly from partial smilers, who in turn did not differ significantly from nonsmilers. In this model, smile intensity accounted for 35% of the explained variability in survival (ratio of chi-squares: 8.2/23.7).

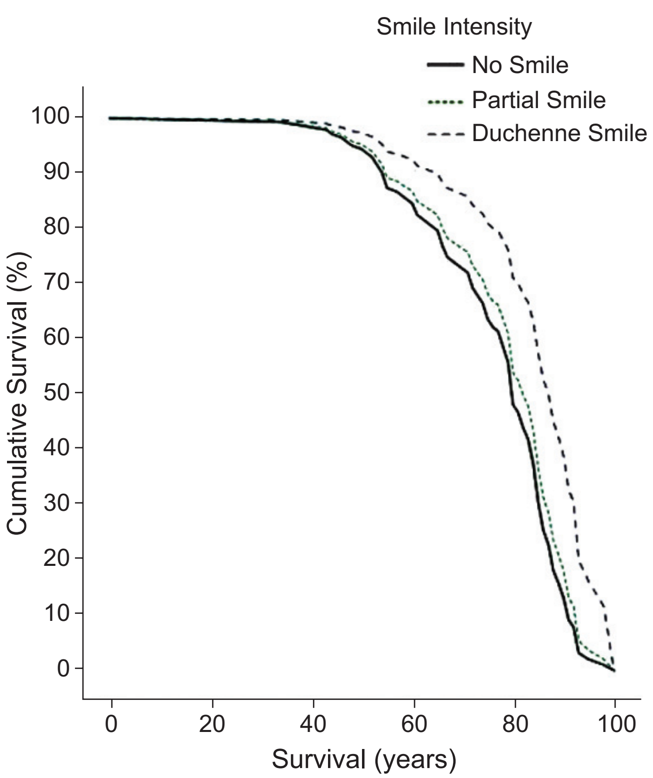

Fig. 1. Percentage of Major League Baseball players surviving to a given age as a function of their smile intensity in photographs. Each curve represents the probability of survival as predicted by a particular smiling behavior: no smile, partial smile, or full (Duchenne) smile.

In a follow-up study, three coders rated the same photographs for attractiveness on a 3-point scale. The correlation between attractiveness and longevity was not significant ($r = .08$). Cox regression analysis substituting attractiveness for smile intensity also showed that attractiveness was not significantly related to longevity.

A growing body of research has shown that basic emotional conditions, such as happiness and sadness, generate differentially patterned autonomic responses (Ekman et al., 1983; Levenson et al.,1990), which influence physical and mental well-being and longevity (Danner, Snowdon, & Friesen, 2001; Maruta, Colligan, Malinchoc, & Offord, 2000; Peterson, Seligman, & Valliant, 1988). To the extent that smile intensity reflects an underlying emotional disposition (Ekman & Friesen, 1978), the results of this study are congruent with those of other studies demonstrating that emotions have a positive relationship with mental health, physical health, and longevity. The data source provided no information as to whether expressions were spontaneous or in response to a photographer's request to smile. However, the fact that relatively few individuals had full Duchenne smiles indicates that even if smiles were requested, smile intensity reflected a general underlying disposition. In other studies, individuals instructed on how to make Duchenne smiles generated patterns of regional brain activity associated with subjective enjoyment (Ekman, Davidson, & Friesen, 1990). If the phenomenology and expressions of emotion are hardwired (Ekman, 2007), individuals whose underlying emotional disposition is reflected in voluntary or involuntary Duchenne smiles may be basically happier than those with less intense smiles, and hence more predisposed to benefit from the effects of positive emotionality. Attractiveness did not influence longevity.

Other examples of what has been termed thin slicing (i.e., brief observations) include the previously mentioned studies of marital satisfaction (Harker & Keltner, 2001; Hertenstein et al., 2009), as well as studies on socioeconomic status (Kraus & Keltner, 2009), sexual orientation (Rule & Ambady, 2008), teacher evaluations (Ambady & Rosenthal, 1993), and voting choices (Todorov, Mandisodza, Goren, & Hall, 2005). The present study indicates that thin slicing can also predict biological variables such as longevity.

Declaration of Conflicting Interests

The authors declared that they had no conflicts of interest with respect to their authorship or the publication of this article.

Note

1. For the purpose of this study, a Duchenne smile was scored if the cheeks were both raised, the corners of the mouth were raised (demonstrating contraction of the zygomatic major muscle), and crow's-feet wrinkles were observed around the eyes (demonstrating contraction of the orbicularis oculi muscle). Contraction of only the

zygomatic muscle was defined as a non-Duchenne smile. Crow's-feet are also associated with non-Duchenne broad smiles, however, and one reviewer noted that the extent to which the eyelid fold is lowered is a more reliable index of Duchenne smiling than crow's-feet are. We did not have neutral photographs available to allow us to rate the photos using this criterion. If neutral photos are available for future studies, researchers should attempt to use this marker to differentiate between Duchenne smiles and broad smiles.

References

Abel, E.L., & Kruger, M.L. (2005). Longevity of major league baseball players. *Research in Sports Medicine*, *13*, 1–5.

Abel, E.L., & Kruger, M.L. (2006). The healthy worker effect in major league baseball revisited. *Research in Sports Medicine*, *14*, 83–87.

Abel, E.L., & Kruger, M.L. (2007). Precocity predicts shorter life for major league baseball players: Confirmation of McCann's precocity-longevity hypothesis. *Death Studies*, *31*, 933–940.

Ambady, N., & Rosenthal, R. (1993). Half a minute: Predicting teacher evaluations from thin slices of nonverbal behavior and physical attractiveness. *Journal of Personality and Social Psychology*, *64*, 431–441.

Danner, D.D., Snowdon, D.A., & Friesen, W.V. (2001). Positive emotions in early life and longevity: Findings from the Nun study. *Journal of Personality and Social Psychology*, *80*, 804–813.

Ekman, P. (2007). The directed facial action task: Emotional responses without appraisal. In J.A. Coan & J.J.B. Allen (Eds.), *Handbook of emotional elicitation and assessment* (pp. 47–53). New York: Oxford University Press.

Ekman, P., Davidson, R.J., & Friesen, W.V. (1990). The Duchenne smile: Emotional expression and brain physiology II. *Journal of Personality and Social Psychology*, *58*, 342–353.

Ekman, P., & Friesen, W.V. (1978). *The Facial Action Coding System: A technique for the measurement of facial movement*. Palo Alto, CA: Consulting Psychologists Press.

Ekman, P., Levenson, R.W., & Friesen, W.V. (1983). Autonomic nervous system activity distinguishes among emotions. *Science*, *221*, 1208–1210.

Freese, J., Meland, S., & Irwin, W. (2006). Expressions of positive emotion in photographs, personality, and later-life marital and health outcomes. *Journal of Research in Personality*, *41*, 488–497.

Harker, L., & Keltner, D. (2001). Expressions of positive emotion in women's college yearbook pictures and their relationship to personality and life outcomes across adulthood. *Journal of Personality and Social Psychology*, *80*, 112–124.

Hertenstein, M.J., Hansel, C.A., Butts, A.M., & Hile, S.N. (2009). Smile intensity in photographs predicts divorce later in life. *Motivation and Emotion*, *33*, 99–105.

Izard, C.E. (1971). *The face of emotion*. New York: Appleton-Century-Crofts.

Kalist, D.E., & Peng, Y. (2007). Does education matter? Major league baseball players and longevity. *Death Studies*, *31*, 653–670.

Kraus, M.W., & Keltner, D. (2009). Signs of socioeconomic status: A thin-slicing approach. *Psychological Science*, *20*, 99–106.

Lahman, S. (2006). *The baseball archive data base*. Retrieved May 17, 2008, from http://baseball1.com/statistics

Levenson, R.W., Ekman, P., & Friesen, W.V. (1990). Voluntary facial action generates emotion-specific autonomic nervous system activity. *Psychophysiology*, *27*, 363–384.

Lillard, L.A., & Panis, C.W.A. (1996). Marital status and mortality: The role of health. *Demography*, *33*, 313–327.

Maruta, T., Colligan, R.C., Malinchoc, M., & Offord, K.P. (2000). Optimists vs. pessimists: Survival rate among medical patients over a 30-year period. *Mayo Clinic Proceedings*, *75*, 140–143.

Peterson, C., Seligman, M.E.P., & Valliant, G.E. (1988). Pessimistic explanatory style is a risk factor for physical illness: A thirty-five year longitudinal study. *Journal of Personality and Social Psychology*, *55*, 23–27.

Rule, N.O., & Ambady, N. (2008). Brief exposures: Male sexual orientation is accurately perceived at 50 ms. *Journal of Experimental Social Psychology*, *44*, 1100–1105.

Spink, J.G.T., Rickart, P.A., & Abramovich, J. (1952). *Baseball register*. New York: C.C. Spink & Son.

Todorov, A., Mandisodza, A.N., Goren, A., & Hall, C.C. (2005). Inferences of competence from faces predict election outcomes. *Science*, *308*, 1623–1626.