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Does Online Media Put Beauty Before Performance? The Impact of Physical Attractiveness on the Popularity of Female Tennis Players in Online Media

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Abstract

Discussions about the impact of physical attractiveness on the popularity of competitive athletes have received much attention from scholars and the worldwide media. We provide new insights into this debate, and draw managerial implications by estimating OLS and Tobit regressions to test whether and to what extent the physical attractiveness of professional female tennis players affects (changes in) their popularity in online media. Based on a sample of the top 100 *Women's Tennis Association* (WTA) single ranking of one selected calendar week in 2011 and 2012, we find that physical attractiveness significantly increases the popularity on *Facebook, SI.com,* and *Google,* as well as the change in online popularity for *Facebook* and *WTA news.* Nevertheless, a tennis players's performance has a larger effect on online popularity than physical attractiveness.

JEL Codes: C12, J71, L83, M31, O50, Z22, Z29

Keywords: online media, performance, physical attractiveness, popularity, tennis, women

Introduction

An athlete's superstar status is mainly based on outstanding performance, but also on popularity (Franck & Nüesch, 2008). Hence, high popularity is important and advantageous for professional athletes in many respects. The importance of online media and its impact on a superstar's popularity and even ability to perform, became obvious

in February 2013 when the female professional tennis player Rebecca Marino surprisingly quit her career due to depression and cyberbullying. Triggered by a following public debate, the social, as well as managerial, relevance of a professional tennis player's popularity in online media such as social networks or sport websites increased rapidly (Seeman, 2013; Rothenberg, 2013).

One important target group of an athlete's popularity is advertisers, who aim for engaging star athletes as endorsers for their products (Fink, Cunningham, & Kensicki, 2004). Regarding the correlation between the degree of popularity and an athlete's earning opportunities, advertisers are willing to pay high revenues for an athlete with a higher popularity or even superstar status (Stone, Joseph, & Jones, 2003). In turn, athletes benefit from a high popularity by earning high wages from endorsement during and even after their career as a professional athlete (Stone et al., 2003). One famous example for this phenomenon is David Beckham, who is great in demand as an endorser in particular because of his popularity and image even after ending his career as a professional football player (Vincent, Hill, & Lee, 2009).

In conclusion, it is questionable which particular non-performance-related factors drive an athlete's popularity (Garcia-del-Barrio & Pujol, 2009). This study focuses on athletes' physical attractiveness as a non-performance-related individual characteristic, which may influence popularity. Hence, the purpose of this study is to examine the impact of female tennis players' physical (especially facial) attractiveness and previous athletic performance on their popularity in different online media. Consequently, the research questions of this study are: 1) What effects does physical attractiveness have on the popularity of female tennis players in particular online media and 2) which determinant—physical attractiveness or previous performance —has a stronger impact on the popularity of female tennis players in selected online media?

The paper is organized as follows: The second section describes the conceptual framework of the study. Afterwards an overview of the related literature and the specific contribution of our study is outlined. The fourth section contains the sample composition and the descriptive statistics. Empirical results are presented in the fifth section. Finally, the results are discussed and conclusions are drawn in the last section.

Conceptual Framework

The conceptual framework of our study is based on three main approaches. First, it ties in with arguments on the superstar phenomenon by Adler (1985, 2006) and Rosen (1981). Second, it makes use of previous definitions of physical attractiveness in terms of facial attractiveness. Third and finally, the reasons for a higher media attention determined by a professional athlete's perceived physical attractiveness are theoretically discussed. Sport economists analysed the emergence of superstars and the vast differences in wages or market value by using the approaches of Adler (1985, 2006) and/or Rosen (1981). These approaches differ regarding the causes for wage differences. Rosen (1981) assumes a magnification effect to be the reason for superstar wages. This means that marginal differences in talent might cause larger earnings differences due to a convex distribution of rewards. Therefore, he assumes less talent to be no substitute for more talent and that a reproduction of the analysed activity is endless with fixed costs. Adler (1985) challenges Rosen's (1981) approach by explaining high wage differences in presence of equal talents. His main argument is

based on Stigler and Becker's (1977) consumption capital approach, which argues that consuming individuals need knowledge about the consumption good and learn about it while they are discussing it with other interested consumers. Since the costs for following a different consumption good rather than other consumers would complicate discussions with them and raise consumption costs, individuals are incentivized to consume goods that other consumers are already using. Then, stardom would be based more on media coverage and network effects than on differences in talent (see Adler, 1985). We are linking both studies by analysing whether previous performance has a convex effect on the online popularity of female tennis players (see Rosen, 1981). Besides, we test whether a non-performance related characteristic in terms of physical attractiveness might also affect online popularity of female tennis players (in the sense of Adler, 1985).

Already in 1921, Perrin states: "Most of us respond unambiguously to physical beauty and ugliness, to a pretty face or a well-proportioned body" (p. 204). Thus, it is by no means astonishing that researchers conclude that the media coverage of female athletes often shows stereotypes which underline physical appearance and attractiveness, but not athletic skills (Bernstein, 2002, p. 421). The perception of physical attractiveness (or beauty) is mainly determined by an individual's facial attractiveness, "while sexual attractiveness is about a sexy body" (Hakim, 2010, p. 500). Following Berr, Simmons, Van Gilder, and O'Neill (2011) or Webster and Driskell (1983), an individual's face is evaluated to be more attractive if her face is highly symmetric, conventional and if the individual's skin is even. According to the "primacy effect" of Anderson (1965), people also positively perceive the personal efficacy of physically attractive individuals. Moreover, Gillan (1999) maintains that female athletes can use physical attractiveness and sex appeal to increase their media coverage and to get more attention from potential sponsors. Moreover, the author states that female tennis players use this bonus to their advantage for a higher salary in advertisement deals and she advises other female athletes to follow their example. By using their glamour, especially female athletes face increased interest from sponsors.

Studies on sports and media coverage show that attractive female athletes receive more attention from the media than less attractive ones (Bernstein, 2002; Vincent, Pedersen, Whisenant, & Massey, 2007). The reasons for this phenomenon are defined and explained by Rosar, Hagenah, and Klein (2010). They define an *Attractiveness Competition Advantage* for more physically attractive individuals compared to less physically attractive ones. Furthermore, they explain this advantage with different mechanisms of action: *Attractiveness Attention Boost, Attractiveness Stereotype, Attractiveness Glamour Effect,* and *Attractiveness Treatment Advantage.* The *Attractiveness Attention Boost* describes that physically attractive people get more attention than less attractive ones (Maner et al., 2003) and are also better evaluated concerning social characteristics like popularity and sociability (Eagly, Ashmore, Makhijani, & Longo, 1991). Moreover, attractive persons can benefit from the so-called *Attractiveness Stereotype* indicating that they are rated as more productive, hardworking, intelligent, creative, and assertive. Physical attractiveness can also lead to the *Attractiveness Glamour Effect.* This effect means that objective misbehavior of beautiful persons does not necessarily lead to a loss of their image (Rosar et al., 2010). The last mechanism, the *Attractiveness Treatment Advantage,* describes that an attractive

person earns more respect in discourse and receive more help and support than a less attractive one (Rosar et al., 2010). Thus, the *Attractiveness Competition Advantage* and its different mechanisms can help to increase the attention and popularity in the media.

Literature Review

Empirical Evidence on Superstar Effects on the Popularity of Professional Athletes

The empirical evidence on the theoretical approaches of Adler (1985, 2006) and Rosen (1981) is inconclusive so far. Following Rosen's approach, Prinz, Weimar, and Deutscher (2012) documented a significant influence of performance on the compensation of professional basketball players. By contrast, they did not find any significant association between popularity and compensation. Likewise, Lucifora and Simmons (2003) found that a football player's wage is highly convex associated with his performance. Moreover, Kiefer (2014) showed for the 2012 UEFA European Football Championships that a football player's performance significantly impacts his market value or popularity. Only for defenders, she found a significant impact of popularity that is not related to performance on the player's market value.

Conversely, the empirical results of Franck and Nüesch (2008) support Adler's approach for German football players in the sense that a player's investment in his popularity is as important as the investment into his physical performance to become a superstar. But later on, Franck and Nüesch (2012) provided empirical evidence that both performance as well as a football player's popularity is crucial to become a superstar. For professional male and female tennis players, Garcia-del-Barrio and Pujol (2009) pointed out that current and past performance of 1,400 professional tennis players has a significant influence on both popularity and notoriety, although performance is not the sole influencing factor. The authors claimed that the number of tournaments and other personal characteristics are also important for the media value development. In addition the authors concluded, that individual characteristics are more important for female tennis players than for male ones (Garcia-del-Barrio & Pujol, 2009).

General Economic Findings on the Effects of Physical Attractiveness on Labour Market Outcomes

Previous economic studies have analysed the impact of physical attractiveness on a variety of individual outcomes. Thereby, all of the following presented (empirical) investigations measured physical attractiveness in terms of facial attractiveness by the evaluations of portraits. The first studies on this research question analysed the impact of physical attractiveness of children, and the grades pupils or academic students received (see Baugh & Parry, 1991; Clifford & Walster, 1973; Dion, Berscheid, & Walster, 1972; Jackson, Hunter, & Hodge, 1995; Landy & Sigall, 1974; Lerner, Delaney, Hess, Jovanovic, & von Eye, 1990; Ross & Salvia, 1975). Moreover, economic studies found that an attractive person has advantages over a less attractive one in job application situations (Dipboye, Arvey, & Terpstra, 1977), in earning opportunities (Biddle & Hamermesh, 1998; Hamermesh & Biddle, 1994) or in election results (Berggren, Jordahl, & Poutvaara, 2010; Efrain & Patterson, 1974; Geys, 2015).

Effects of Physical Attractiveness on the Performance and Popularity of Professional Athletes

The physical attractiveness of professional athletes is strongly related to stereotypes that might impact the popularity of (female) professional athletes. For instance, Bernstein (2002) pointed out that stereotypes are related to physical appearance and attractiveness but not to athletic skills. Furthermore, the author showed that during the Olympic Games in 2000, more photos of the American female high jumper Amy Acuff were published than of the more successful American female sprinter and long jumper Marion Jones. Using press information, several researchers stated that hyper-feminine athletes receive more attention from the media than their rather muscular and athletic counterparts (Fink & Kensicki, 2002; Krane, 2001; Vincent et al., 2007). Krane (2001) even claimed that "women who appear heterosexually feminine are privileged over women perceived as masculine" (p. 115). The author stated that women who are not perceived as feminine have to accept consequences such as a lack of media attention and endorsements.

So far, there is empirical evidence on the impact of a football player's physical attractiveness on performance. For instance, Rosar et al. (2010) compared the performance of more or less physically attractive German football players. In this study, physical attractiveness is measured in terms of facial attractiveness. The degree of facial attractiveness was calculated by the average test persons' evaluations of each player's portrait which were collected from *kicker.de*. The authors found that more attractive German football players significantly perform worse than their less attractive peers. Interestingly enough, this effect depends on the attractiveness of the entire team that the player plays for. If the team's attractiveness is homogeneous and high, the authors find a positive relationship between physical attractiveness and performance.

Moreover, Rosar, Hagenah, and Klein (2013) analysed whether physical attractiveness of a professional football player influences his performance evaluations by sport reporters and coaches. In doing so, the authors measured physical attractiveness in terms of body shape by calculating each player's body mass index (BMI). Furthermore, the authors measured each player's facial attractiveness by the test persons' (average) evaluations of portraits that were provided on the player's profile webpages on *kicker.de*. The authors assumed that media reporting about professional football players may impact his future athletic performance and consequently affect his future career. Their empirical findings clarified that performance evaluations of the German newspapers and magazines *Kicker, SportBILD, BILD,* and *BILD am Sonntag* are not significantly distorted by physical attractiveness.

Effects of Physical Attractiveness on the Popularity of Professional Tennis Players

Building on Krane's (2001) idea of stereotypes and focusing on professional tennis, Vincent et al. (2007) showed that different British newspapers (*The Times, Daily Mail,* and *The Sun*) reported more frequently on Anna Kournikova during Wimbledon 2000 than on other players, including the 2000 Wimbledon Champions Pete Sampras and Venus Williams, although Kournikova lost her first round match. Thus, Gillan (1999) maintained that female athletes could use physical attractiveness and sex appeal to increase their media coverage and receive more attention from potential sponsors. Furthermore, the author stated that female tennis players have been using

this bonus for a while, and suggested that other female athletes should follow their example (Gillan, 1999).

Moreover, the findings of Bakkenbüll and Kiefer (2015) showed that more physically attractive female tennis players earn significantly more prize money than less attractive female tennis players.

Contribution of this Study

This study contributes to three strands in the economic literature. First, we provide new empirical evidence to the strand of superstar effects on individual popularity in professional sports. Second, this study contributes to previous empirical findings in the general economic literature, which shows to which extent physical attractiveness impacts the individual compensation or job chances. Since this study focusses on the physical attractiveness of professional tennis players, the present paper contributes to empirical findings on stereotypes and their effects on a professional athlete's performance. Moreover, we tie in with previous sport economic findings on how physical attractiveness impacts a professional athlete's performance and compensation in a variety of sports. Furthermore, we refer to studies, which previously analyzed the impact factors of a tennis player's popularity.

The contributions of this study are manifold. A novelty of this study is that it measures online popularity at two different years. Thus, we can determine and analyse changing effects of performance and physical attractiveness on online popularity over one year. Conversely to earlier studies on individual popularity of professional athletes in team sports (see Franck & Nüesch, 2008, 2012; Lucifora & Simmons, 2003; Rosar et al., 2010, 2013), this study refers to the clearly measurable individual performance of tennis players, which depends on the individual talent, and training, as well as the opponent's skills and match performance. The analysed performance measurement does not depend or is distorted by the individual position within the team and the team colleagues' performance.

Furthermore, this study clarifies the specific impact of physical attractiveness (and performance) on different types of online media, such as sport websites (SI.com, and the official website of the WTA (*WTA new*s), the online social network *Facebook,* and the search engine *Google*.

Sample Composition and Descriptive Statistics

Our data sample consists of female tennis players who were ranked in the top 100 of the *WTA* singles ranking in the 35th calendar week in 2011. The detailed ranking is presented in the archive of *Kicker.de* (2012). In the following year and the same calendar week, the dataset was extended with actual information regarding the performance as well as popularity in the investigated online media. However, Dinara Safina quit her career within this time gap, thus she is not included in the analyses for the year 2012 as well as the change in popularity between 2011 and 2012. The results of the descriptive statistics for the sample are presented in Table 1.

Dependent Variables

Data illustrating the popularity of each tennis player in online media was acquired during the randomly selected 35th calendar week in 2011 as well as 2012. Two types of online media were differentiated: On the one hand, those types that reflect the interest

Table 1. Descriptive Statistics

Dependent Variables	Obs.	Mean	SD	Min	Max
Facebook likes 2011	99	84,169.03	544,327.65	0.00	5,332,198.00
ln Facebook likes 2011	98	7.16	2.71	2.64	15.49
Facebook likes 2012	98	131,761.12	828,444.06	4.00	8,053,151.00
ln Facebook likes 2012	98	7.98	2.59	1.39	15.90
Change in Facebook likes from 2011 to 2012	98	45,974.50	279,765.03	-18,195.00	2,720,953.00
ln Change in Facebook likes from 2011 to 2012	95	7.23	2.45	3.58	14.82
Google 2011	100	1,259,975.00	1,906,819.00	12,400.00	15,100,000.00
ln Google 2011	100	13.33	1.29	9.43	16.53
Google 2012	99	43,457.07	47,931.65	730.00	296,000.00
ln Google 2012	99	10.18	1.06	6.59	12.60
WTA news 2011	100	155.01	145.60	7.00	624.00
ln WTA news 2011	100	4.57	1.05	1.95	6.44
WTA news 2012	99	209.86	206.04	7.00	1080
ln WTA news 2012	99	4.88	1.03	1.95	6.98
Change in mentions on WTA news from 2011 to 2012	99	55.96	72.10	-8.00	516
ln Change in mentions on WTA news from 2011 to 2012	97	3.43	1.17	.00	6.25
SI.com 2011	100	146.67	362.72	2.00	2,342.00
ln SI.com 2011	100	3.75	1.47	.69	7.76
SI.com 2012	99	217.84	466.82	1.00	2,860.00
ln SI.com 2012	99	4.34	1.41	.00	7.96
Change in mentions on SI.com from 2011 to 2012	99	73.80	125.51	-10.00	725.00
ln Change in mentions on SI.com from 2011 to 2012	89	3.53	1.40	.00	6.59
Explanatory Variables					
Career Prize Money in $ 2011/100,000	100	35.913	54.945	1.32	333.62
Career Prize Money in $ 2012/100,000	99	42.929	61.291	4.055	381.771
Change in Career Prize Money in $ from 2011 to 2012/100,000	99	7.723	11.266	.157	63.409
Physical Attractiveness	100	3.07	1.09	0.99	5.36
Controls					
BMI	100	21.05	1.41	16.69	24.51
Age in 2011	100	24.97	3.69	19.00	41.00
Age in 2012	99	25.97	3.71	20.00	42.00
Dummy Asian	100	.09	.29	0.00	1.00
Dummy Hispanic	100	.13	.34	0.00	1.00
Dummy African American	100	.02	.14	0.00	1.00
Ref.: Caucasian	100	.76	.43	0.00	1.00

of private persons in female professional tennis players such as social networks and on the other hand, those that reflect the interest of sport journalists. This procedure is based on the results of Prinz et al. (2012), which highlighted the agreement in the literature that network effects and media coverage can together describe popularity effects. Building on the studies of Franck and Nüesch (2008, 2012), Garcia-del-Barrio and Pujol (2007), Lehmann and Schulze (2008), and Prinz et al. (2012), popularity is analysed on the basis of media coverage such as *Google* hits, *Facebook* likes, homepages, citations in newspapers, or professional journals (for an overview, see Prinz et al., 2012). Building on these results, this study analyses a female tennis player's popularity in the online media *Facebook, SI.com, WTA news,* and *Google*. Since 2008, *Facebook* has been the most popular social network (Weinberg, 2010). This social network had a 63.6% monthly penetration of Internet users in Europe at the end of 2010 and enlarged its worldwide number of active monthly users up to over 845 million by the end of 2011 (comScore, 2011; Facebook, 2012). *Facebook* offers private persons as well as corporations the registration of a profile. Thus, corporations or popular persons such as professional tennis players are able to publish content on an online pin board and upload photos and videos to share with the community of this network (Hellmueller & Aeschbacher, 2010). Interested parties, mostly private persons and particularly fans, have the opportunity to connect with professional tennis players by clicking a button named *like* (Weinberg, 2010). In this paper, we count the number of *like* followers of each female tennis player in this social online network. As the majority of *Facebook* members are private individuals, we assume the number of *like* followers is an indicator of the number of persons who have a private interest in the tennis players and want to connect with them. In this sample, the tennis player Laura Pous-Tio had no Facebook account and hence is excluded from the analysis of this social network. On average, we observe 84,169.03 followers on *Facebook* in 2011 as well as 131,761.12 followers in 2012. From 2011 to 2012 the change in average accounts for about 45,974.50 followers.

The popularity in sport journalism was measured by mentions on the homepage of *WTA news* as well as on the homepage of the sport magazine *Sports Illustrated,* which belongs to CNN Digital Network. In particular, the homepage of the magazine *Sports Illustrated* (SI.com) was chosen to examine how far the result of Fink and Kensicki (2002), indicating that there exists a substitution of athletic ability by stereotypical conceptions, can be confirmed. A mean of 146.67 mentions on the homepage of *SI.com* in 2011 as well as a mean of 217.84 in 2012 is observed for the analysed sample. Moreover, the average change in mentions from 2011 to 2012 accounts for 73.80 mentions.

The website *WTAtennis.com* belongs to the Women's Tennis Association (WTA), which "is the global leader in women's professional sport with more than 2,500 players representing 92 nations competing for more than $100 million in prize money at the WTA's 54 events and four Grand Slams in 33 countries" (WTA, 2013). In our sample, the average number of mentions on the homepage of *WTA news* is 155.01 in 2011, 209.86 in 2012, and the average change in mentions between these two years is about 55.96.

Finally, the online media popularity of each tennis player is also measured by the number of results on the most popular search engine *Google*. The corporation realized a total global market share of 78.64% in April 2012 (Kwak, Lee, Park, & Moon,

2010; Net Applications, 2012). The number of mentions for each female tennis player is collected by using the keyword code *WTA + news + name of the tennis player – Facebook – Twitter.* Thus, we considered all results that include the keywords WTA, news and the name of each tennis player. The documented results do not include mentions in conjunction with *Facebook* or *Twitter* and, thus, imply one type of mainly private interest of individuals. The data collection originally included the number of followers in the social network Twitter. Due to the low numbers of tennis players who had an account at that time, this online medium (44 persons) will not be evaluated in the following analysis. Admittedly, it cannot be excluded that these numbers of results not only imply mentions in journalistic sources but also mentions of private persons on homepages or forums outside of Facebook or Twitter. It follows that the measured number of results on Google represents the number of mentions in the news. While Franck and Nüesch (2012) estimated the impact of performance on non-performance-related press citations, our measurement relies on Franck and Nüesch (2008). Here the authors used Google citations to measure general publicity in the Internet, as well as citations in over 20 German newspapers and weekly magazines. Since we investigate whether performance or the non-performance-related physical attractiveness has a stronger impact on popularity, we cannot exclude performance-related hits in our study. Consequently, the measurement of this online medium will be generally assigned to the category of professional interest in tennis players. In 2011, an average number of 1,259,975 results can be found on Google. Conversely, only 43,457.07 results are found in 2012. Thus, it can be concluded that the searching algorithm of Google changed over time. In consequence, this analysis does not include these differences in results between these two years due to the limitation of this comparative item and therefore the corresponding results.

Explanatory Variables

As an indicator of performance, this study includes the prize money (divided by 100,000) that each tennis player has earned during her career before the 35th calendar week in 2011 and 2012. Furthermore, the increase in prize money that a female tennis player earned between these two years will be investigated. Sources of these data were the individual players' profiles on the homepage of the WTA. The earned prize money is suitable to measure the performance and particularly the success of each female tennis player. This assumption is supported by the fact that this measure includes the number of participated tournaments or matches. Simultaneously, the prize money not only indicates the number of matches but also the number of successes as well as the importance of each victory. Thus, a victory in a popular tournament is endowed with higher prize money than less important matches. For the current sample, we observe an average amount of $3,591,288.83 US dollars in 2011 and an average sum of $4,292,909.15 US dollars in 2012. The average increase in prize money between these two years is about $772,270.33 US dollars.

The physical attractiveness of each woman was evaluated with the help of an online questionnaire. Following Hakim (2010), who indicated that facial attractiveness stands for beauty and remains static, facial attractiveness can easily be grasped by test persons. Hence, we follow the established method of several studies (see Berggren, Jordahl, & Poutvaara, 2010; Geys, 2015; Rosar et al., 2010, 2013) to measure facial attractiveness by the average test persons' evaluations of the tennis players' portraits. Therefore, we

collected the portraits of 100 tennis players who were listed in the ranking of the 35th calendar week 2011. We collected these portraits from the player's profiles on the WTA homepage or on Kicker (2012). Criteria for the selection of pictures were that the face and neck of each woman were photographed in a frontal position. The background of the picture and the clothes worn were standardized, and jewelry was blanked to minimize distortion of the evaluation. Furthermore, natural looking and artless portraits were chosen so that we excluded pictures from evening events or photo shootings for magazines with obvious face-painting. In order to ensure equal chances, we finally compared all chosen pictures and recollected alternative pictures if we perceived the pictures to be too disadvantageous or advantageous. We tested five different subsamples including 20 different tennis players each in separate questionnaires. Finally, 20 different questionnaires existed in four different versions to control for distortions caused by the position that a picture had in each questionnaire. Ultimately, each picture was shown at the beginning, in the middle or at the end of a questionnaire.

At the beginning of each questionnaire, the respondents were asked to evaluate twenty women but were not informed that these women are professional tennis players. This information was kept from the test persons to minimize the influence of recognition and popularity that could distort the pure evaluation of attractiveness. Furthermore, the order of questions was as follows. First, the test persons provided characteristics of their age, gender, and university where they study or used to study. The attractiveness was measured with a Likert scale from zero to seven without a mid-point to avoid a high proportion of middle answers. Consequently, neutral answers were excluded (Garland, 1991). After evaluating twenty portraits, the test persons were asked whether they had recognized any of the women to control for the before-mentioned distortive impact on the evaluation of physical attractiveness. Finally, the subjects were asked whether they are interested in sports, play tennis, or watch tennis on TV. These questions were also included to control for the effect of recognition and to allow for a more detailed segmentation of the test persons.

We invited 925 students from three German universities to take part in the survey. In sum, 396 persons answered the online-questionnaire, which resulted in a response rate of 42.81%. Admittedly, only 382 responses could be used because of a technical error that distorted the outcome of one questionnaire. In fact, the rate of return includes a high rating quantity. Every picture was evaluated at least 60 to 90 times.

Evaluating the characteristics of the interviewees reveals that the average age of our study participants was approximately 23 years, with a standard deviation of 4.233, a minimum of 18, and a maximum age of 56 years. In sum, 51.8% of the interviewees were male, while 47.9% were female, and 0.3% did not indicate any gender.

All evaluations were summed up by calculating the mean evaluation for each female tennis player. The minimum average evaluation of one tennis player is 0.99, while the highest average score is 5.36. Therefore, an average degree of physical attractiveness of 3.07 can be observed for our sample. For the calculation of this mean, we considered all test persons that participated in the online survey because the majority of evaluations showed no significant differences between particular subgroups of test persons. This insight was attained by using t-tests to find out whether subgroups of test persons who recognized one of the tennis players evaluated significantly differently than the reference group of persons who did not recognize the evaluated women as popular tennis players. The same methodology was used to test differences between gender

Table 2. Descriptive Statistics of Respondents

	N	Missings	Mean Evalution	Std. Dev.	Median	Min.	Max.
Age	366	16	23	4.233	22	18	56
			Frequency Male	**Frequency Female**			
Gender	381	1	51.80%	47.90%			

Source: Own compilation

and test persons who stated (not) to be interested in tennis, (not) to play tennis, or (not) to inform themselves about tennis via any media. Interestingly, the results reveal that 36 tennis players were significantly better evaluated by women than by men. Conversely, only two tennis players were significantly better evaluated by men than by women.

Furthermore, we tested whether Hispanic (13), African American (2), Asian (9) or Caucasian (76) tennis players were evaluated significantly differently in our sample. Table 3 provides an overview about the respondents' gender or age group and their average evaluations.

Table 3. Mean Evaluations for the Entire Sample and Subsamples

Group	N	Mean	Std. Dev.	Min.	Max.
All	382	4.055	0.86615	0	6.65
Male	198	3.8091	0.8219	1.6	5.5
Female	183	4.344	0.77398	2.2	6.65
Missing gender	1				
Age below/equal 23	223	4.0354	0.88534	0	6.65
Age above 23	143	4.0748	0.86399	1.6	5.8
Missing age	16				
Age below/equal Median (=22)	187	4.0222	0.88846	0	6.65
Age above Median (=22)	179	4.0807	0.86444	1.6	6.15
Missing age	16				

Source: Own compilation

The results of t-tests reveal no significantly different evaluations for any subgroup. Finally, only 4% to 13% of the participants (depending on the separation criteria) evaluated significantly differently than the reference group such that distortions caused by recognition can be excluded.

Controls

Different studies found that age and perceived physical attractiveness have a negative relationship, particularly for women (Mathes, Brennan, Haugen, & Price, 1985; McLellan & McKelvie, 1993). For example, McLellan and McKelvie (1993) found that older faces were rated as less attractive than young faces. Following these results, this study controls for the effect of female tennis players' (absolute and squared) age on

popularity in online media in the following analysis. We considered age squared, because of the possible nonlinearity of the variable age (Franck & Nüesch, 2008). Furthermore, we control for age as a proxy for the players' individual career length, since the absolute career length and age show a strong correlation (r=0.891) in our study. So, we assume older tennis players have had more time to build up their popularity. While an average age of 24.97 years can be found in 2011, the average age in 2012 is analogously 25.97 years.

According to the findings of e.g. Bakkenbüll and Kiefer (2015), we include a control variable for the body shape of each tennis player in terms of the Body Mass Index (BMI) because physical attractiveness is not only determined by facial attractiveness but also by the perceived body shape. Since differences in the female professional tennis player's body shape are easily observable due to their sport outfits, it is also necessary to control for this part of physical attractiveness. This index is calculated by dividing the weight (measured in kilograms) through the square of the size (measured in metres) (Tao, 2008). In the sample, the average BMI amounts to 21.05. Because the tennis player's profiles give the same characteristics regarding weight and size in 2011 as well as in 2012, the same index is used for each following analysis.

According to the findings of Berri, Van Gilder, and Fenn (2014), the forthcoming analysis controls for the skin colour by implementing dummy variables for Asian, Hispanic, and African American female tennis players with Caucasian as a common reference category. Our sample contains 9% Asian, 13% Hispanic, 2% African American, and 76% Caucasian female tennis players.

Method

The empirical analysis of this paper is based on the Ordinary Least Squares (OLS) regression (see Cameron & Trivedi, 2009). For four different online media (*Facebook, SI.com, WTA news,* and *Google*), we estimate the impact of physical attractiveness and previous performance on the popularity on the particular website while controlling for several individual characteristics. The dependent variable of each model is the logarithm of the amount of mentions on the particular homepage of the above-mentioned online media in 2011, 2012 as well as the difference in mentions between these two years. Since the histograms of our popularity measurements indicate a rather strong left-shift than a normal distribution for each online medium and because the results of White-tests reveal that OLS-regressions with the original measurements suffer from hetereoskedasticity, we calculate the logarithm for each dependent variable. This is a common approach in studies which analyse popularity measurements of professional athletes such as Franck and Nüesch (2008), Prinz et al. (2012), or Kiefer (2014).

In order to test for the existence of Rosen's (1981) argued convex effects of marginal differences in performance on an athlete's popularity in online media, we include the square term of performance in each estimation model.

In case of significant non-linear performance effects on the popularity in online media, we report the critical amounts of career prize money earned which we identified by illustrating each curve progression.[1] Moreover, each of the following estimations

[1] Likewise, we also tested for a possible convex effect of physical attractiveness on the popularity in each online medium. Since we do find only linear effects of physical attractiveness on our dependent variables, we only present estimations including the linear terms in order to avoid unnecessary multicollinearity.

includes the same controls, apart from the control for age and the BMI. Because the difference of age between 2011 and 2012 equally accounts for one year, this control variable is excluded in each OLS regression which analyses the change in mentions between these two years. Due to possible distortions because of multicollinearity, we exclude the BMI from each estimation model to check if physical attractiveness has a robust effect on the popularity in the particular online media. In order to answer our research question whether performance or physical attractiveness have a stronger impact on online popularity, standardized coefficients are provided to give an idea about the effect size.

Empirical Analysis

Facebook

The results of six OLS regressions for the network *Facebook* are presented in Table 4. Physical attractiveness has a significant positive and linear effect on the number of *Facebook likes* in all regression models. For a tennis player's previous performance in terms of earned prize money, the results reveal a significant positive and linear impact on the number of *Facebook likes* in 2011. Conversely, we find a significant convex effect of previous performance on the number of *Facebook likes* in 2012 and the change in *Facebook* likes between 2011 and 2012. Nevertheless, we do not find a typical inverse u-shape but a change in the overall positive increase instead (because the regression coefficients for the square terms of previous performance are comparatively small). In more detail, we find a critical career prize money earned of $10 million US dollars in 2012. The effect of previous career earnings lower than $10 million US dollars (on *Facebook likes*) increases sharply from $5 million US dollars compared to earnings lower than $5 million US dollars. For all previous earnings higher than $10 million US dollars up to the maximum of $38,177,100 US dollars, we find a slighter increasing impact on the number of *Facebook likes* compared to those between $5 million US dollars until $10 million US dollars. However, this increase of *Facebook likes* is sharper for the best performing tennis players compared to those below the $5 million US dollars threshold (see models 3 and 4, Table 4). Hence, our estimations reveal empirical evidence for Rosen's (1981) argument of convex effects of marginal differences in previous performance on the tennis player's popularity in online-media. The same holds true, for the change in *Facebook likes* between 2011 and 2012 (see models 5 and 6, Table 4). Again, we find the change in previous performance in terms of career prize money earned to significantly impact the change in *Facebook likes* between both years. This impact increases sharply after a change of at least $5 million US dollars (see models 5 and 6, Table 4). Likewise, our findings indicate empirical evidence for Rosen's (1981) assumption of marginal differences in talent to have a convex impact on a female tennis player's change in *Facebook likes*.

For our controls, there is a significant u-shaped effect of age on the number of *Facebook* likes in 2012. In both models (3 and 4, Table 4) a critical age of 35 is identified. For a tennis player's ethnicity, Hispanic female tennis players have a significantly higher number of *Facebook likes* in 2012 than Caucasian female tennis players (see models 3 and 4, Table 4). Furthermore, African American female tennis players have a significant higher change in *Facebook likes* between 2011 and 2012 than Caucasians

Table 4. Results of the OLS-regressions for Facebook likes

ln Facebook likes	(1) 2011		(2) 2011		(3) 2012		(4) 2012		(5) Change		(6) Change	
	Coeff.	Std. Coeff.	Coeff.	Std. Coeff.	Coeff.	Std. Coeff.	Coeff.	Std. Coeff.	Coeff.	Std. Coeff.	Coeff.	Std. Coeff.
Prize Money $ Career (in this year/ change) /100,000	0.0537***	1.059	0.0580***	1.1454	0.0552***	1.3098	0.0568***	1.3480	0.293***	1.3705	0.284***	1.3253
	(0.0120)		(0.0118)		(0.00750)		(0.00742)		(0.0465)		(0.0470)	
Prize Money $ Career² (in this year/ change) /100,000	-1.00e-09	-.5355	-1.19e-09*	-.6378	-1.05e-09***	-.7492	-1.10e-09***	-.7813	-3.56e-08***	-.8765	-3.24e-08***	-.7973
	(6.08e-10)		(6.02e-10)		(3.31e-10)		(3.30e-10)		(8.80e-09)		(8.79e-09)	
Physical Attractiveness	0.923***	.3618	0.990***	.3882	0.794***	.3369	0.836***	.3546	0.577***	.2592	0.659***	.2958
	(0.183)		(0.179)		(0.141)		(0.138)		(0.150)		(0.147)	
BMI	-0.233	-.1179			-0.141	-.0773			-0.228**	-.1338		
	(0.143)				(0.109)				(0.114)			
Age	-0.743	-.9844	-0.835*	-1.1068	-1.148***	-1.648	-1.201***	-1.7247				
	(0.449)		(0.449)		(0.342)		(0.341)					
Age²	0.0118	.8421	0.0133	.9494	0.0186***	1.4462	0.0195***	1.5144				
	(0.00825)		(0.00827)		(0.00630)		(0.00629)					
Dummy Asian	-0.301	-.0311	-0.285	-.0295	-0.477	-.0534	-0.463	-.0518	-0.784	-.0941	-0.746	-.0896
Ref.: Caucasian	(0.691)		(0.697)		(0.531)		(0.533)		(0.508)		(0.516)	
Dummy Hispanic	0.908	.1103	0.803	.0976	1.072**	.1410	1.012**	.1331	0.207	.0281	0.0874	.0119
Ref.: Caucasian	(0.583)		(0.585)		(0.448)		(0.447)		(0.462)		(0.465)	
Dummy African American	1.040	.0527	1.432	.0725	1.670	.0916	1.590	.0872	3.036***	.1786	2.660**	.1565
Ref.: Caucasian	(3.262)		(3.282)		(2.223)		(2.231)		(1.077)		(1.078)	
Constant	18.57***		14.75**		23.33***		20.98***		8.617***		3.589***	
	(6.378)		(5.980)		(4.870)		(4.531)		(2.553)		(0.463)	
Observations	99		99		98		98		95		95	
R-squared	0.599		0.587		0.726		0.721		0.685		0.670	
White-Test (chi²/prob)	28.87/.673		43.86/.393		21.17/ 0.928		23.81/.985		19.07/.452		18.77/.846	

Note: *p<.10; **p<.05; ***p<.01; unstandardized regression coefficient and standard errors in parentheses are displayed in the first column of each model. In models 3 to 6, we have missing values due to missing Facebook accounts/likes (changes), end of careers, or zero values (so that no logarithm can be calculated for).

(see models 5 and 6, Table 4). No robust significant impact of other control variables on the number of Facebook likes can be observed.

Regarding the standardised coefficients, we observe that the career prize money earned has a larger impact on the number of *Facebook likes* than physical attractiveness

SI.com

Table 5 presents the results of six OLS regressions, including the mentions on *SI.com* in 2011 and 2012 as well as the difference of mentions between these two years as dependent variables. Physical attractiveness of female tennis players has a significant positive and linear impact on the number of mentions on *SI.com,* in the estimations for 2011 and 2012. In contrast, we find no significant impact for the change in mentions on *SI.com*.

Moreover, the career prize money earned has a significant positive but convex impact on the number and the change in mentions on this homepage. For 2011 and 2012, we find $2.5 million US dollars to be the critical career prize money earned from where the impact of previous performance on the number of mentions on *SI.com* increases sharply (see models 1 to 4, Table 5). For the change in mentions on *SI.com,* we find a critical change in career prize money earned of $5 million US dollars from where the positive impact of performance on the change in mentions on *SI.com* increases sharper than below $5 million US dollars (see models 5 and 6, Table 5). For *SI.com,* these findings indicate empirical evidence for Rosen's (1981) argument, too.

Regarding the implemented controls, we find only weakly significant evidence for a u-shaped effect of age on the number of mentions on *SI.com* in 2012 (see models 3 and 4, Table 5). However, there are significant ethnical differences for the number of mentions on *SI.com.* Compared to Caucasian female tennis players, Asian female tennis players have significantly more mentions on this webpage in 2011. Only a weakly significantly higher number of mentions is indicated for African American female tennis players compared to Caucasians in this year. Likewise, Hispanic female tennis players show significantly more mentions on *SI.com* in 2012. In addition, African American female tennis players have a significantly higher change in mentions on *SI.com.* The further implemented control variables have no significant impact on the number of mentions on *SI.com*.

Referring to the standardized coefficients, the performance and success of a female tennis player has a larger impact on the number of mentions on SI.com than physical attractiveness in all estimations.

WTA news

Table 6 shows the results of the OLS regressions for the website of the *WTA news,* which point out that physical attractiveness only has a significant positive impact on the change in mentions on the website of *WTA news* (from 2011 to 2012).

Like Rosen (1981) predicted, the career prize money earned has a significant positive but convex impact on the dependent variable in all estimations (see models 1 to 6, Table 6). Like for mentions on *SI.com,* the critical previous earnings are $2.5 million US dollars (for 2011 and 2012) from where the positive impact of previous performance on the number of mentions on *WTA news* increases sharper than below this threshold. For the change in mentions, we observe a slightly sharper increase of career prize money earned on the change in mentions on *WTA news* from a threshold

Table 5. Results of the OLS-regressions for mentions on SI.com

ln Mentions on SI.com	(1) 2011		(2) 2011		(3) 2012		(4) 2012		(5) Change		(6) Change	
	Coeff.	Std. Coeff.	Coeff.	Std. Coeff.	Coeff.	Std. Coeff.	Coeff.	Std. Coeff.	Coeff.	Std. Coeff.	Coeff.	Std. Coeff.
Prize Money $ Career (in this year/change) /100,000	0.0511***	1.9059	0.0506***	1.8898	0.0383***	1.6657	0.0382***	1.6608	0.214***	1.7799	0.212***	1.7674
	(0.00422)		(0.00410)		(0.00387)		(0.00380)		(0.0312)		(0.0309)	
Prize Money $ Career² (in this year/change) /100,000	-1.33e-09***	-1.3486	-1.31e-09***	-1.3294	-8.10e-10***	-1.0551	-8.07e-10***	-1.0510	-2.79e-08***	-1.2356	-2.74e-08***	-1.2135
	(2.14e-10)		(2.09e-10)		(1.72e-10)		(1.70e-10)		(5.88e-09)		(5.75e-09)	
Physical Attractiveness	0.159**	.1177	0.152**	.1128	0.170**	.1321	0.167**	.1299	-0.0121	-.0094	0.00159	.0012
	(0.0644)		(0.0624)		(0.0730)		(0.0707)		(0.103)		(0.0975)	
BMI	0.0232	.0222			0.00997	.0100			-0.0355	-.0358		
	(0.0506)				(0.0567)				(0.0795)			
Age	-0.134	-.3351	-0.125	-.3124	-0.342*	-.9003	-0.338*	-.8905				
	(0.157)		(0.156)		(0.177)		(0.174)					
Age²	0.00211	.2851	0.00196	.2652	0.00543*	.7726	0.00537*	.7639				
	(0.00290)		(0.00287)		(0.00326)		(0.00322)					
Dummy Asian	0.508**	.0992	0.506**	.09895	0.174	.0357	0.173	.0355	-0.182	-.0351	-0.179	-.0345
Ref.: Caucasian	(0.244)		(0.243)		(0.275)		(0.274)		(0.375)		(0.373)	
Dummy Hispanic	0.298	.0684	0.309	.0709	0.552**	.1330	0.556**	.1340	0.230	.0582	0.218	.0553
Ref.: Caucasian	(0.205)		(0.203)		(0.232)		(0.229)		(0.295)		(0.293)	
Dummy African American	2.256*	.2156	2.217*	.2119	1.472	.1479	1.478	.1485	1.692**	.1797	1.633**	.1735
Ref.: Caucasian	(1.151)		(1.143)		(1.153)		(1.147)		(0.709)		(0.694)	
Constant	3.372		3.756*		7.376***		7.543***		3.046*		2.260***	
	(2.243)		(2.072)		(2.518)		(2.319)		(1.785)		(0.318)	
Observations	100		100		99		99		89		89	
R-squared	0.820		0.820		0.750		0.750		0.586		0.585	
White Test (chi²/ prob)	17.80/.986		20.42/.998		15.93/0.992		18.60/.999		11.43/.909		15.89/.939	

Note: *p<.10; **p<.05; ***p<.01; unstandardized regression coefficient and standard errors in parentheses are displayed in the first column of each model. In models 3 to 6, we have missing values due to one end of careers or zero values (so that no logarithm can be calculated for).

Table 6. Results of the OLS-regressions for mentions on WTA news

ln Mentions on WTA news	(1) 2011		(2) 2011		(3) 2012		(4) Change		(5) Change		(6) Change	
	Coeff.	Std. Coeff.	Coeff.	Std. Coeff.	Coeff.	Std. Coeff.	Coeff.	Std. Coeff.	Coeff.	Std. Coeff.	Coeff.	Std. Coeff.
Prize Money $ Career (in this year/ change) /100,000	0.0333***	1.7450	0.0331***	1.7330	0.0256***	1.5267	0.0256***	1.5264	0.161***	1.5700	0.160***	1.5616
	(0.00485)		(0.00471)		(0.00383)		(0.00376)		(0.0258)		(0.0256)	
Prize Money $ Career² (in this year/change) /100,000	-1.09e-09***	-1.542	-1.08e-09***	-1.5278	-6.53e-10***	-1.1657	-6.53e-10***	-1.1655	-2.13e-08***	-1.0906	-2.09e-08***	-1.0727
	(2.46e-10)		(2.40e-10)		(1.70e-10)		(1.68e-10)		(4.87e-09)		(4.79e-09)	
Physical Attractiveness	0.105	.1093	0.102	.1056	0.118	.1256	0.118*	.1255	0.174**	.1642	0.183**	.1729
	(0.0740)		(0.0717)		(0.0722)		(0.0699)		(0.0818)		(0.0792)	
BMI	0.0123	.0165			0.000490	.0007			-0.0300	-.0359		
	(0.0582)				(0.0560)				(0.0635)			
Age	0.0975	.3427	0.102	.3596	0.0628	.2264	0.0630	.2271				
	(0.181)		(0.179)		(0.175)		(0.172)					
Age²	-0.00206	-.3900	-0.00213	-.4048	-0.00148	-.2888	-0.00149	-.2894				
	(0.00333)		(0.00329)		(0.00322)		(0.00318)					
Dummy Asian	0.0792	.0217	0.0784	.0215	0.0583	.0164	0.0582	.0164	-0.123	-.0308	-0.120	-.0299
Ref.: Caucasian	(0.280)		(0.279)		(0.272)		(0.270)		(0.281)		(0.280)	
Dummy Hispanic	0.328	.1055	0.333	.1073	0.410*	.1355	0.411*	.1355	0.468*	.1375	0.456*	.1338
Ref.: Caucasian	(0.236)		(0.233)		(0.229)		(0.227)		(0.248)		(0.245)	
Dummy African American	2.699**	.3617	2.679**	.3590	1.527	.2099	1.527	.2100	0.914	.1120	0.865	.1059
Ref.: Caucasian	(1.324)		(1.313)		(1.140)		(1.133)		(0.596)		(0.584)	
Constant	2.027		2.231		3.056		3.064		2.597*		1.941***	
	(2.580)		(2.381)		(2.489)		(2.292)		(1.412)		(0.248)	
Observations	100		100		99		99		97		97	
R-squared	0.532		0.532		0.541		0.541		0.572		0.571	
White Test (chi²/ prob)	21.68/.935		31.87/.872		17.21/.985		24.00/.984		6.80/.995		10.39/.997	

Note: *p<.10; **p<.05; ***p<.01; unstandardized regression coefficient and standard errors in parentheses are displayed in the first column of each model. Missings are due to end of careers or zero values (so that no logarithm can be calculated for).

of $500,000 US dollars (see models 5 and 6, Table 6).

On *WTA news,* Hispanic female tennis players have a weakly significantly higher number of mentions in 2012 as well as a higher change in mentions than Caucasians. We also find African American female tennis players to have significantly more mentions than Caucasians in 2011. Further control variables such as the BMI have no significant impact on the number of mentions in any estimation.

Considering the standardised coefficients, it can be observed that the prize money has a larger impact on the number of mentions on *WTA news* than physical attractiveness in each regression model.

Google

Along the same lines, the results for *Google* are illustrated in Table 7. The results indicate that the number of mentions on *Google* are significantly positively influenced by a higher level of physical attractiveness of each female tennis player. This effect is significant and linear for 2011 as well as for 2012. As in the other models before, the career prize money earned has a significant positive impact on the dependent variable. However, this effect is convex in 2012. Here, we find that the effect of previous earnings on the number of *Google* mentions increases sharper from $1 million US dollars (see models 3 and 4, Table 7). For the model without the BMI (see model 4, Table 7), we find $5 million US dollars as a further critical amount of previous earnings from where the positive impact increases lower than between $1 and $5 million US dollars but sharper than below $1 million US dollars. Therefore, we find empirical evidence for Rosen's (1981) argument that marginal differences in performance have a convex impact on a female tennis player's popularity on *Google* in 2012.

Regarding further controls, we find Asian female tennis players to have significantly less mentions on *Google* than Caucasians in 2011. Conversely, we find Hispanic tennis players to have significantly more mentions on *Google* than Caucasian in 2012. All other control variables have no significant impact on the number of results in this search engine.

Similarly, previous performance has the largest impact on the number of mentions on *Google,* compared to physical attractiveness.

Robustness Check

In order to check for the robustness of our empirical findings, we varied the methodology by estimating log-linear models Tobit- instead of OLS-regressions in order to control for the lower and upper limits of our popularity measurements in this sample and resulting inconsistent parameter estimates of the OLS-regressions (see Cameron & Trivedi, 2009). The variation of the estimation method enables us to test if our empirical findings can be replicated by using a Maximum-Likelihood estimation (Tobit) instead of a least-square estimation (OLS). The detailed results for each online medium are presented in Tables 8 to 11.

In sum, the effects of performance on the female tennis player's popularity in the four analysed online-media remain robust over all estimations. Interestingly and except for the number of mentions on *Google* in 2011, we find significant positive but convex effects of previous career prize money earned (respectively performance) on the popularity in the analysed online media. Hence, these estimations provide further support for the robustness of Rosen's (1981) argument. Likewise, the results

Table 7. Results of the OLS-regressions for mentions on Google

ln Mentions on Google	(1) 2011		(2) 2011		(3) 2012		(4) 2012	
	Coeff.	Std. Coeff.	Coeff.	Std. Coeff.	Coeff.	Std. Coeff.	Coeff.	Std. Coeff.
Prize Money $ Career in this year /100,000	0.0195***	.8266	0.0181***	.7707	0.0210***	1.210	0.0208***	1.1954
	(0.00675)		(0.00657)		(0.00408)		(0.00401)	
Prize Money $ Career ² /100,000	-3.15e-10	-.3626	-2.57e-10	-.2961	-4.56e-10**	-.7857	-4.49e-10**	-.7738
	(3.43e-10)		(3.36e-10)		(1.81e-10)		(1.79e-10)	
Physical Attractiveness	0.255**	.2154	0.235**	.1981	0.269***	.2765	0.262***	.2699
	(0.103)		(0.100)		(0.0770)		(0.0746)	
BMI	0.0709	.0772			0.0217	.0289		
	(0.0810)				(0.0597)			
Age	-0.245	-.6997	-0.218	-.6208	0.0592	.2062	0.0673	.2345
	(0.252)		(0.250)		(0.186)		(0.184)	
Age²	0.00520	.8003	0.00475	.7312	-0.00200	-.3753	-0.00213	-.4004
	(0.00464)		(0.00460)		(0.00343)		(0.00340)	
Dummy Asian	-1.298***	-.2885	-1.302***	-.2895	0.198	.0536	0.196	.0531
Ref.: Caucasian	(0.390)		(0.390)		(0.290)		(0.288)	
Dummy Hispanic	0.387	.1011	0.419	.1096	0.551**	.1755	0.560**	.1785
Ref.: Caucasian	(0.329)		(0.326)		(0.244)		(0.242)	
Dummy African American	-0.874	-.0951	-0.993	-.1080	0.711	.0945	0.724	.0962
Ref.: Caucasian	(1.841)		(1.834)		(1.215)		(1.209)	
Constant	13.39***		14.57***		7.939***		8.303***	
	(3.588)		(3.325)		(2.654)		(2.445)	
Observations	100		100		99		99	
R-squared	0.404		0.399		0.514		0.513	
White Test (chi²/prob)	49.33/.204		38.30/.242		20.72/.997		18.78/.969	

Note: *$p<.10$; **$p<.05$; ***$p<.01$; unstandardized regression coefficient and standard errors in parentheses are displayed in the first column of each model. Missings are due to an end of one career.

of the Tobit regressions show that the effect of physical attractiveness on the female tennis players' popularity in online media remains robust in all estimations.

Discussions and Conclusions

Although the influence of physical attractiveness on the popularity of competitive athletes has been widely discussed, only few studies examined this relationship for professional female tennis players. This article uses data from the top 100 WTA single rankings of the 35th calendar week in 2011 and 2012 to estimate whether physical attractiveness of professional female tennis players has an impact on their popularity in

Table 8. Results of the Tobit-Regressions for Facebook Likes

Tobit ln Facebook likes	(1) 2011	(2) 2011	(3) 2012	(4) 2012	(5) Change	(6) Change
Prize Money $ Career (in this year/change) /100,000	0.0561***	0.0604***	0.0553***	0.0570***	0.293***	0.284***
	(0.0109)	(0.0108)	(0.00721)	(0.00718)	(0.0445)	(0.0452)
Prize Money $ Career² (in this year/change) /100,000	-1.10e-09**	-1.29e-09**	-1.03e-09***	-1.08e-09***	-3.56e-08***	-3.24e-08***
	(5.50e-10)	(5.48e-10)	(3.20e-10)	(3.21e-10)	(8.42e-09)	(8.46e-09)
Physical Attractiveness	0.936***	1.002***	0.802***	0.845***	0.577***	0.659***
	(0.166)	(0.164)	(0.136)	(0.133)	(0.144)	(0.141)
BMI	-0.227*		-0.150		-0.228**	
	(0.130)		(0.106)		(0.109)	
Age	-0.824**	-0.914**	-1.156***	-1.213***		
	(0.406)	(0.409)	(0.329)	(0.330)		
Age²	0.0130*	0.0144*	0.0188***	0.0197***		
	(0.00746)	(0.00753)	(0.00606)	(0.00608)		
Dummy Asian	-0.293	-0.277	-0.474	-0.459	-0.784	-0.746
Ref.: Caucasian	(0.626)	(0.635)	(0.510)	(0.515)	(0.486)	(0.497)
Dummy Hispanic	0.925*	0.822	1.084**	1.020**	0.207	0.0874
Ref.: Caucasian	(0.528)	(0.533)	(0.431)	(0.432)	(0.442)	(0.448)
Dummy African American	1.334	1.716	1.415	1.389	3.036***	2.660**
Ref.: Caucasian	(2.951)	(2.988)	(2.169)	(2.182)	(1.030)	(1.038)
Constant	19.61***	15.88***	23.61***	21.10***	8.617***	3.589***
	(5.777)	(5.450)	(4.693)	(4.382)	(2.443)	(0.446)
Sigma	1.678***	1.704***	1.369***	1.382***	1.370***	1.401***
	(0.121)	(0.123)	(0.0993)	(0.100)	(0.0994)	(0.102)
Observations	99	99	98	98	95	95
Pseudo-R^2	0.2035	0.1972	0.2712	0.2669	0.2498	0.2401

Note: *$p<.10$; **$p<.05$; ***$p<.01$; unstandardized regression coefficient and standard errors in parentheses are displayed in the first column of each model. In models 3 to 6, we have missing values due to missing Facebook accounts/likes (changes), end of careers, or zero values (so that no logarithm can be calculated for)

Table 9. Results of the Tobit-Regressions for Mentions on SI.com

Tobit ln Mentions on SI.com	(1) 2011	(2) 2011	(3) 2012	(4) 2012	(5) Change	(6) Change
Prize Money $ Career (in this year/change) /100,000	0.0511***	0.0506***	0.0383***	0.0382***	0.214***	0.213***
	(0.00401)	(0.00391)	(0.00371)	(0.00366)	(0.0304)	(0.0303)
Prize Money $ Career² (in this year/change) /100,000	-1.33e-09***	-1.31e-09***	-8.11e-10***	-8.07e-10***	-2.80e-08***	-2.75e-08***
	(2.03e-10)	(2.00e-10)	(1.64e-10)	(1.63e-10)	(5.73e-09)	(5.64e-09)
Physical Attractiveness	0.159**	0.152**	0.172**	0.168**	-0.00659	0.00699
	(0.0611)	(0.0596)	(0.0700)	(0.0681)	(0.100)	(0.0957)
BMI	0.0232		0.0106		-0.0354	
	(0.0480)		(0.0543)		(0.0775)	
Age	-0.134	-0.125	-0.342**	-0.338**		
	(0.149)	(0.148)	(0.169)	(0.168)		
Age²	0.00211	0.00196	0.00543*	0.00537*		
	(0.00275)	(0.00274)	(0.00312)	(0.00310)		
Dummy Asian	0.508**	0.506**	0.175	0.174	-0.175	-0.171
Ref.: Caucasian	(0.231)	(0.232)	(0.263)	(0.263)	(0.365)	(0.366)
Dummy Hispanic	0.298	0.309	0.553**	0.558**	0.239	0.227
Ref.: Caucasian	(0.195)	(0.194)	(0.222)	(0.221)	(0.288)	(0.287)
Dummy African American	2.256**	2.217**	1.472	1.478	1.692**	1.633**
Ref.: Caucasian	(1.092)	(1.090)	(1.104)	(1.104)	(0.691)	(0.680)
Constant	3.372	3.756*	7.347***	7.525***	3.014*	2.231***
	(2.128)	(1.977)	(2.411)	(2.233)	(1.742)	(0.312)
Sigma	0.621***	0.622***	0.708***	0.708***	0.917***	0.918***
	(0.0439)	(0.0440)	(0.0508)	(0.0508)	(0.0701)	(0.0702)
Observations	100	100	99	99	89	89
Pseudo-R^2	0.4762	0.4756	0.3865	0.3864	0.2422	0.2415

Note: *p<.10; **p<.05; ***p<.01; unstandardized regression coefficient and standard errors in parentheses are displayed in the first column of each model. In models 3 to 6, we have missing values due to one end of careers or zero values (so that no logarithm can be calculated for).

several online media as well as on the change in mentions in the media. The combined impact of physical attractiveness, and the career prize money earned, on the popularity, as well as its change on *Facebook, SI.com, WTA news,* and *Google* was tested. We find that physical attractiveness has a significant positive and robust impact on the number of *Facebook likes* and mentions on *SI.com* and *Google.* By contrast, physical attractiveness has only a significant positive impact on the change in mentions on *WTA news*, but does not significantly affect the change in mentions on *SI.com*.

Table 10. Results of the Tobit-regressions for mentions on WTA news

Tobit ln Mentions on WTA news	(1) 2011	(2) 2011	(3) 2012	(4) 2012	(5) Change	(6) Change
Prize Money $ Career (in this year/change) /100,000	0.0334***	0.0332***	0.0256***	0.0257***	0.161***	0.160***
	(0.00465)	(0.00453)	(0.00369)	(0.00364)	(0.0250)	(0.0249)
Prize Money $ Career² (in this year/change) /100,000	-1.09e-09***	-1.08e-09***	-6.32e-10***	-6.35e-10***	-2.13e-08***	-2.10e-08***
	(2.36e-10)	(2.31e-10)	(1.64e-10)	(1.63e-10)	(4.71e-09)	(4.66e-09)
Physical Attractiveness	0.104	0.100	0.119*	0.122*	0.176**	0.184**
	(0.0709)	(0.0691)	(0.0696)	(0.0678)	(0.0792)	(0.0770)
BMI	0.0117		-0.00997		-0.0286	
	(0.0557)		(0.0546)		(0.0615)	
Age	0.0989	0.103	0.0634	0.0598		
	(0.173)	(0.172)	(0.168)	(0.167)		
Age²	-0.00208	-0.00215	-0.00150	-0.00144		
	(0.00319)	(0.00317)	(0.00310)	(0.00308)		
Dummy Asian	0.0815	0.0807	0.0585	0.0595	-0.121	-0.117
Ref.: Caucasian	(0.268)	(0.269)	(0.262)	(0.262)	(0.272)	(0.272)
Dummy Hispanic	0.329	0.335	0.416*	0.412*	0.470*	0.458*
Ref.: Caucasian	(0.226)	(0.225)	(0.221)	(0.220)	(0.240)	(0.239)
Dummy African American	2.708**	2.689**	1.283	1.283	0.912	0.865
Ref.: Caucasian	(1.267)	(1.264)	(1.117)	(1.116)	(0.576)	(0.568)
Constant	2.019	2.212	3.259	3.091	2.558*	1.932***
	(2.469)	(2.292)	(2.403)	(2.220)	(1.366)	(0.241)
Sigma	0.721***	0.721***	0.704***	0.704***	0.766***	0.767***
	(0.0514)	(0.0514)	(0.0508)	(0.0508)	(0.0555)	(0.0556)
Observations	100	100	99	99	97	97
Pseudo-R^2	0.2548	0.2547	0.2671	0.2670	0.2654	0.2647

Note: *$p<.10$; **$p<.05$; ***$p<.01$; unstandardized regression coefficient and standard errors in parentheses are displayed in the first column of each model. In models 3 to 6, we have missing values due to one end of careers or zero values (so that no logarithm can be calculated for).

Furthermore, we find a significant positive impact of performance on online popularity which is non-linear but positive for the number of *Facebook likes* (in 2012 and the change), mentions on *SI.com* and *WTA news,* as well as the number of mentions on *Google* in 2012. These findings support Rosen's (1981) argument that marginal differences in previous performance result in larger earning differences for superstars.

As in previous general economic studies on the impact of physical attractiveness on labour market outcomes, we also find a significant positive impact of a professional

Table 11. Results of the Tobit-Regressions for Mentions on Google

Tobit ln Mentions on Google	(1) 2011	(2) 2011	(3) 2012	(4) 2012
Prize Money $ Career (in this year) /100,000	0.0197***	0.0186***	0.0210***	0.0208***
	(0.00652)	(0.00639)	(0.00387)	(0.00382)
Prize Money $ Career² (in this year) /100,000	-3.05e-10	-2.53e-10	-4.56e-10***	-4.49e-10***
	(3.31e-10)	(3.26e-10)	(1.71e-10)	(1.71e-10)
Physical Attractiveness	0.261**	0.244**	0.269***	0.262***
	(0.0995)	(0.0974)	(0.0730)	(0.0711)
BMI	0.0623		0.0217	
	(0.0786)		(0.0566)	
Age	-0.246	-0.222	0.0592	0.0673
	(0.243)	(0.242)	(0.176)	(0.175)
Age²	0.00521	0.00482	-0.00200	-0.00213
	(0.00448)	(0.00447)	(0.00326)	(0.00324)
Dummy Asian	-1.298***	-1.302***	0.198	0.196
Ref.: Caucasian	(0.377)	(0.378)	(0.275)	(0.275)
Dummy Hispanic	0.393	0.421	0.551**	0.560**
Ref.: Caucasian	(0.317)	(0.316)	(0.232)	(0.231)
Dummy African American	-1.040	-1.157	0.711	0.724
Ref.: Caucasian	(1.784)	(1.785)	(1.152)	(1.153)
Constant	13.56***	14.60***	7.939***	8.303***
	(3.470)	(3.228)	(2.516)	(2.331)
Sigma	1.012***	1.015***	0.738***	0.739***
	(0.0727)	(0.0730)	(0.0525)	(0.0525)
Observations	100	100	99	99
Pseudo-R^2	0.1528	0.1510	0.2444	0.2439

Note: *p<.10; **p<.05; ***p<.01; unstandardized regression coefficient and standard errors in parentheses are displayed in the first column of each model. Missings are due to an end of one career.

female tennis player's physical attractiveness on the individual acceptance with respect to popularity. Referring to previous sport economic studies, our results are not in line with each previous finding. First, our findings also confirm that more attractive tennis players have a higher popularity in online media as Bernstein (2002), Krane (2001) or Fink and Kensicki (2002) outlined for diverse press information. In particular and according to Fink and Kensicki (2002), who found a positive association between physical attractiveness and number of mentions in the journals *Sports Illustrated* and *Sports Illustrated for Women,* we confirm a significant positive impact of physical attractiveness on the tennis player's popularity on *SI.com.* In contrast to Vincent et al. (2007), we cannot empirically confirm that physical attractiveness has a significant positive influence on the absolute popularity of professional female tennis players on the *WTA news.* Furthermore, this finding supports those of Rosar et al. (2013) who find that sport journalists report objectively about the performance of

male professional soccer players. Since we only found a significant positive impact of physical attractiveness on the change in mentions on *WTA news,* no distortions of reports on this sport journalistic website resulting from physical attraction are identified here.

Contrary to the indications of studies which find female athletes to be seen more in terms of attractiveness than based on their success, one important result of this study is that previous performance is more a driver of popularity in the investigated online media than physical attractiveness. Thus, we confirm the results of Fink et al. (2004) who observed that the expertise of female athletes is more important than physical attractiveness concerning the probability to be booked as a brand ambassador or to attract an audience for a sporting event.

The investigation of these research questions is of high relevance due to the statistically significant relationship between media value and endorsement fees (Garcia-del-Barrio & Pujol, 2009; Pujol & Garcia-del-Barrio, 2006). Following this correlation, an athlete's online-popularity can be considered as a proxy for actually unavailable advertising incomes of professional female tennis players. Hence, this study fills this research gap by providing new insights on the relevance, as well as effective strength of physical attractiveness on a female tennis player's media value with respect to her opportunity of acquiring advertisement-jobs.

Finally, this study yields practical implications on online-media-specific strategies of whether and how physical attractiveness might increase a tennis player's popularity. One implication that players can learn from our findings is to pay (more) attention to their individual physical attractiveness both on and off the court because their popularity is significantly affected by it. In a further step, tennis players might think about developing a brand identity or strategies for viral marketing. According to the findings of Krane (2001), indicating that female tennis players have to decide whether they want to build on their physical attractiveness, and hence maintain the balance between success and femininity, these results suggest an integrated communication of athletic success as well as pictures or video clips that are offered to both private fans, particularly on *Facebook*. This recommendation for viral marketing is based on our finding that female tennis players such as Maria Sharapova partly fit the profile of hyper-feminine women. In conclusion, these tennis players appear to meet the challenge of a balanced communication of success as well as physical attractiveness.

This study is limited for different reasons and provides opportunities for further research. One limitation of our study is that the evaluations of the tennis player's physical attractiveness might be biased since we only asked students of a German university for their evaluation. Hence, we cannot control for evaluation differences of physical attractiveness between our evaluators and e.g. US-American readers of *SI.com* or users of *Facebook* with a differing culture. After evaluating several studies on the differing perception of physical attractiveness, we found inconclusive empirical results. While some studies indeed find differing evaluations of physical attractiveness depending on the test person's culture (like Jones & Hill, 1993; Shaffer, Crepaz, & Sun, 2000; Swami & Tovée, 2005;), there are also studies like those of Furnham and Baguma (1994) or Cunningham, Roberts, Barbee, and Wu, (1995) who do not find significant differences in the evaluation of physical attractiveness. Admittedly, Furnham and Baguma (1994) only find different evaluations for extremely obese or

anorectic body shapes. Since the body shapes of professional tennis players do not vary that dramatically, we see no link to our study. Moreover, the framework of this study does not allow us to focus on evaluation differences due to culture so that future research might investigate how the evaluators' culture might affect the perception of the (tennis players') physical attractiveness and the resulting effect on the popularity in online media. Further analysis could be complemented by considering the off-court media coverage of female tennis players that could increase the popularity in the analysed online media. This would include reports about players' activities such as being a brand ambassador for sponsors or other advertising contracts, which are actually unavailable. Furthermore, extending the evaluation of physical attractiveness by interviewing people of all ages could support as well as modify the validity of our results. In addition, our results only indicate the effects for the tested media; thus, the effect of physical attractiveness on the popularity on further online or even non-electronic media such as newspapers or journals could also be investigated. Finally, future research could also include the mutual influence of online media.

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