

NEGATIVE SOCIAL MEDIA AND ITS INFLUENCE ON ATHLETE'S  
PERFORMANCE

By

Bernd R. Huber

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Committee Membership

Dr. Amanda Hahn, Committee Chair

Dr. Amber Gaffney, Committee Member

Dr. Ethan Gahtan, Committee Member

Dr. Amber Gaffney, Program Graduate Coordinator

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## **Abstract**

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Bernd R. Huber

This study aimed to investigate the potential impact of negative social media content on athletes' cortisol levels and subsequent performance. The study focused on the change in cortisol levels and differences in free throw performance, based on previous research findings. We hypothesized that negative social media postings would increase the stress experienced by student-athletes, resulting in elevated cortisol levels and decreased performance. Additionally, participants ( $n = 8$ ) completed a questionnaire to examine the interaction between preexisting fear and the biological stress response. Contrary to expectations, there was no significant change in stress response, and negative postings did not have a significant negative influence on performance. Fear of negative evaluation did not interact with cortisol levels or correlate with performance outcomes. The results indicate potential complexities in the relationship between social evaluation, cortisol response, and athletic performance. In conclusion, this study highlights the need for further investigation into the influence of negative social media on athletic performance. Given the significant impact of social media in today's society, it is crucial to assess the potential adverse effects and develop strategies to protect athletes from these potential threats.

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## Introduction

Over the last decade social media has become a primary communication tool for maintaining social networks. Social media platforms serve the dual function of social communication and entertainment, supplying news across the globe, labels societal trends, and creating opinions; Facebook, Twitter, TikTok, and Instagram have partially replaced TV networks and Newspapers. However, this development is associated with some negative aspects as well – crude conspiracy theories, cyberbullying and hate speech are but a few examples of the downsides of the social media success story (Sanderson & Truax, 2014). A recent umbrella review (i.e., review of review articles and meta-analyses; Valkenburg et al., 2022) suggests that the influence social media usage has had on mental health is unclear and studies conducted in the field show varying results. Brooks (2015) findings showed lower levels of happiness and increased stress were related to more regular use of social media and can possibly interfere with performance tasks, whereas Berryman et al. (2014) did not find significant evidence for a negative correlation between social media usage and mental health.

One group that may be particularly vulnerable to social media effects is athletes, as they are constantly subjected to observation and evaluation by millions of viewers through social media. In the past athletes were being critically evaluated by coaches, journalists, friends, and family, today social media plays a major role in athletic evaluation. Athletes, and their performance, are more directly exposed to both positive and negative comments through social media posts made about them or directed to them. At the same time, a greater number of followers can create more attention for potential

sponsoring and is viewed as especially important for college athletes with limited income opportunities to gain more recognition of their athletic abilities. David et al. (2018) found that National Collegiate Athletic Association (NCAA) Division I student athletes use Twitter mainly out of marketing reasons and that they are aware of the possibility the mere exposure online can lead to an increase of criticism of their performance. It remains unclear, however, how this virtual social evaluation might influence athletes' performance.

### **Social Media as Social Evaluative Threat**

Social evaluative threat refers to the psychological and physiological responses that arise from the fear of negative evaluation from others (Dickerson & Kemeny, 2004). In other words, being judged, evaluated, and possibly rejected or excluded by others, can lead to anxiety and stress. Social evaluative threat can occur in a variety of social situations, including public speaking, job interviews, performance evaluations, or any situation where an individual feels that they are being observed, evaluated, or judged by others. People who are highly sensitive to social evaluative threats may experience greater distress and negative outcomes in social situations, and they may be more prone to social anxiety, often feeling self-conscious and worrying excessively about being embarrassed or humiliated. The fear of negative evaluation can trigger the release of stress hormones, such as cortisol and adrenaline, which can lead to physiological responses like increased heart rate, sweating, and muscle tension. These responses can increase anxiety and impair performance.

In order for athletes to perform at their best, they need to stay focused and maintain their concentration. Mental preparedness is as important as physical fitness when it comes to successful athletic performance (Gould et al., 2002). Research has shown that when athletes worry about failing during a competition or feel socially evaluated by an audience, they may experience increased stress. For example, Mesagno et al. (2012) investigated the relationship between anxiety and the fear of being negatively evaluated, and how it can change an athlete's performance. The results showed the greater the worries of receiving negative feedback the greater the anxiety and the bigger the influence on the performance. Thus, impression management likely plays a significant role in athletic performance and athletes may be particularly susceptible to the impact of social evaluation (Leary, 1992; James & Collins, 1997).

Indeed, social evaluative threat impacts athletic performance across a wide variety of sporting types. Epting et al. (2011) explored "live" social evaluation and its impact on athletic performance by exposing athletes to positive (i.e., cheering) or negative (i.e., booing) feedback. The results indicated that positive feedback led to increased motivation and reduced anxiety, resulting in better athletic performance compared to the no feedback and negative feedback conditions. At the same time, negative feedback resulted in decreased motivation and increased anxiety, leading to poorer athletic performance compared to the no feedback and positive feedback conditions. These findings have



implications for the role of feedback in enhancing athletic performance and the importance of creating positive and supportive environments for athletes.

Social media can provide social evaluative threat by creating a platform where individuals can receive feedback, both positive and negative, on their athletic identity as well as on their behavior. The individuals can receive feedback in the form of likes, comments, and shares on their posts, which can serve as indicators of social approval or disapproval. Additionally, social media allows for the creation of online communities, which can lead to comparisons with others who may have different social identities, lifestyles, or levels of success. Such evaluation may have negative consequences for one's social status, reputation, or self-esteem. The constant availability of social feedback on social media may lead to increased self-monitoring and anxiety about one's social identity and behavior, as well as increased concern about the perceptions of others (James & Collins, 1997; David et al., 2018). For example, athletes may create a negative self-image when they reflect on their own performance, which when they fail to perform can have a negative influence on their self-esteem (Leary, 1992). Indeed, Facebook use before an event has been found to not only disrupt the preparation of players, it also can lead to higher levels of sport anxiety (Encel et al., 2017).

### **Stress and the HPA Axis**

Neuroendocrinological studies have shown an increase in cortisol (i.e., a “stress response”) often occurs when we are negatively evaluated by others (Dickerson et al.,

2008). Cortisol release is governed by the Hypothalamic-Pituitary-Adrenal (HPA) axis, which is a complex system involved in the body's stress response, consisting of three main components: the hypothalamus, the pituitary gland, and the adrenal gland. In response to a stressor, the hypothalamus releases Corticotropin-Releasing Hormone (CRH), which stimulates the anterior pituitary gland to release Adrenocorticotropic Hormone (ACTH). ACTH, in turn, activates the sympathetic nervous system by stimulating the adrenal gland to release cortisol – a stress hormone into the bloodstream. Cortisol is essential for the body's stress response and helps to mobilize energy stores and increase blood sugar levels. It also plays a role in regulating the immune system, blood pressure, and inflammation.

The cortisol response to a social-evaluative stressor in children and adolescents with varying levels of social anxiety was investigated by Van den Bos et al. (2017). Adolescents with higher levels of social anxiety had a significantly blunted cortisol response to the stressor compared to participants with lower levels of social anxiety. In addition, subjects with higher levels of social anxiety performed worse on the stressor task than participants with lower levels of social anxiety. These results suggest that children and adolescents with social anxiety may have a dysregulated HPA axis response to social-evaluative stress, which may contribute to the maintenance of their social anxiety symptoms.

The affiliation motive which represents humans' basic need for social interaction is assumed to influence stress responses. The implicit affiliation motive refers to an individual's unconscious or automatic desire for social connection, belongingness, and affiliation with others. It is a psychological construct that relates to the underlying motivation to form and maintain positive social relationships. The implicit affiliation motive can influence different aspects of behavior, including social interactions and group dynamics. If the implicit affiliation motive moderates cortisol responses to acute psychosocial stress in high school students was investigated by Wegner et al. (2014). They found that participants with a higher implicit affiliation motive had a greater cortisol response to the stressor and reported less negative affect after the stressor than participants with a lower need for social interaction. These findings suggest that the implicit affiliation motive may serve as a protective factor against the negative effects of acute psychosocial stress.

Denson et al. (2009) conducted a comprehensive review of 66 studies that measured cortisol or immune responses to social stressors or emotion inductions. They found that cognitive appraisals, particularly those related to threat and challenge, were related to cortisol and immune responses. Individuals who appraised the stressor as threatening had higher cortisol levels and lower immune function, while those who appraised the stressor as challenging had higher cortisol levels and higher immune function. Furthermore, individuals who experienced negative emotions had higher cortisol levels and lower immune function compared to the subjects who experienced

positive emotions. These findings suggest promoting positive cognitive appraisals and emotions, individuals may be able to reduce the negative impact of stress on their health.

### **Stress and Athletic Performance**

The relationship between stress and athletic performance is complex, and research suggests that stress can have both positive and negative effects on performance, depending on the level of stress experienced. The "stress U curve" model – also known as the inverted-U hypothesis (Yerkes & Dodson, 1908; Arent & Landers, 2010), proposes that moderate levels of stress can be beneficial for performance, while both low and high levels of stress can have negative effects. According to this model, at low levels of stress, athletes may lack the necessary motivation and arousal to perform at their best. As stress levels increase to moderate levels, athletes may experience increased motivation, focus, and performance. Nevertheless, as stress levels continue to increase to high levels, athletes may become overwhelmed and experience negative effects on performance, including anxiety, fatigue, and impaired decision-making. Factors such as the athlete's personality, coping strategies, and level of experience can also influence the relationship between stress and performance. For example, athletes with high levels of anxiety may be more susceptible to the negative effects of stress, while athletes with effective coping strategies may be better able to manage stress and maintain optimal performance. Overall, the stress U curve model suggests that moderate levels of stress can be beneficial for athletic performance, but too much or too little stress can have negative effects.

One way that stress may impact athletic performance is through “choking”. Choking refers to the negative impact of pressure on performance, whereby an athlete performs well below their abilities due to the pressure or stress (i.e., “they choke”). Otten (2009) studied this phenomenon in competitive golfers. The golfers were asked to complete two rounds of a golf game under two different conditions: a low-pressure condition and a high-pressure condition. The high-pressure condition was induced by telling participants that the game was a qualifying round for a prestigious tournament, whereas the low-pressure condition was described as a practice round. The results of the study showed that participants in the high-pressure condition performed significantly worse than those in the low-pressure condition. This indicates that the participants experienced choking under pressure. However, further analysis revealed that a subset of participants performed better under high-pressure conditions, indicating “clutch performance”. Clutch performance refers to the ability of an individual to perform at a high level under pressure or in critical situations. It typically involves performing well in situations that are perceived as high-stakes, where the outcome is important and may have a significant impact on the individual or their team. In addition, Otten found that higher levels of pre-competition anxiety were associated with worse performance under high-pressure conditions, indicating that the level of anxiety may play a role in the experience of choking. In contrast, Mascaret et al. (2016) examined the influence of the Trier Social Stress Test (TSST) on cortisol responses and free throw performance in

basketball players. The TSST is a valid well-established laboratory stress test that has been used in research to induce psychological and physiological stress responses.

Generally, it involves a simulated public speaking task and a mental arithmetic task performed in front of an audience or video camera, with feedback provided by the experimenter. The results showed that the TSST caused a significant increase in athletes' cortisol levels, but there was no significant impact on athletic performance (as measured by number of free throws made vs missed). Together, these results provide equivocal evidence for the impact of stress on athletic performance.

### **Cortisol, Social Evaluation and Evaluation Apprehension**

Evaluation apprehension refers to the concern or anxiety that individuals feel when they believe they are being observed, judged, or evaluated by others (Cottrell et al., 1968). It is a psychological concept that highlights the influence of social evaluation on human behavior. When individuals experience evaluation apprehension, they become more conscious of their actions and behaviors, particularly in situations where their performance or competence is being assessed by others. The fear of negative evaluation can lead to heightened self-awareness and self-consciousness, which may affect their performance or behavior. On one hand, it can motivate individuals to perform better and strive for excellence when they perceive the evaluation as an opportunity to prove themselves or receive positive feedback, which is considered the social facilitation effect (Zajonc, 1965). In such cases, evaluation can enhance performance and lead to improved

outcomes. On the other hand, excessive evaluation apprehension can also have detrimental effects. It may lead to performance anxiety, fear of failure, or even avoidance of situations where evaluation is present. The fear of being negatively judged or criticized can hinder individuals' ability to perform at their best and may contribute to stress or performance-related issues. Negative social evaluation has been linked to increased stress and cortisol levels in several studies. Hostinar et al. (2015) examined the effects of negative social evaluation on cortisol levels in a group of young adults. Participants were asked to give a speech in front of an audience and were given either negative or neutral feedback on their performance (i.e., social evaluation). The results showed that participants who received negative feedback had significantly higher cortisol levels compared to those who received neutral feedback. Equivalent, another study found that individuals who reported higher levels of Fear of Negative Evaluation (FNE) had higher cortisol responses to a social stress task compared to those with lower levels of FNE (Shirotsuki et al., 2009). Similarly, Rohleder et al.(2007) investigated the effects of social-evaluative threat on cortisol responses in competitive ballroom dancers. The researchers measured cortisol levels in 31 competitive ballroom dancers before, during, and after a dance competition where the dancers are observed and evaluated by judges. In addition, they assessed their subjective experiences of stress. The results of the study showed that cortisol levels increased in response to the competition, especially for dancers who reported experiencing higher levels of social-evaluative threat. The same

pattern has been observed in male college golfers, who had increased cortisol right before and during the competition compared to baseline measurements in training sessions (Doan et al., 2007).

The aforementioned studies have all focused on live social feedback. Social media, however, offers a novel virtual method of receiving social evaluation from peers. Several studies show social media can create an environment where social evaluative threat is more likely to occur, which can affect the concentration and confidence of sports athletes, especially when comments are negative (David et al., 2018). Such negative comments are not limited to the quality of the athlete's performance; they may target personal aspects of an athlete like religion, sexual orientation, disability, gender, and race (Kavanagh et al., 2016). Sanderson and Truax (2014) outline the four most used categories of negative comments posted on Twitter as: belittling, mocking, sarcasm or threatening of athletes. Furthermore, cyberbullying behavior have been shown to increase when an athlete has greater popularity and is more present in the media (Dogar, 2019). This can disrupt the preparation of athletes and can lead them to experience higher levels of sport anxiety (Encel et al., 2017). However, the impact of this virtual social evaluation on athletes' performance and mental wellbeing remains relatively understudied.

### **The Current Study**

The literature shows different factors interact with sports performance and the effect social media has on athletes varies. The purpose of this research is to further



investigate those variables, by putting the focus on the association between negative social media content, cortisol levels, and sports performance. Previous research on competitive ballroom dancers found that in person social evaluative threat triggered significant increases in dancers' cortisol levels (Rohleder et al., 2007). The first aim of the current study was to determine whether exposure to virtual social evaluative threat via negative social media posts triggers a stress response among college athletes. Another study investigating the impact of stress on athletic performance among basketball players found that although stress (elicited via the TSST, which includes social evaluation) caused elevated cortisol levels among athletes, their athletic performance was not significantly hindered by this stressor (Mascret et al., 2016). The authors speculate that stress may have differential effects on athlete performance depending on a variety of factors, including the motivational and physiological state of the athlete. The second aim of this study was to explore whether individual differences in sensitivity to negative social evaluation may impact the relationship between stress and athletic performance. Greater knowledge about the topic could help institutions develop prevention programs which support athletes when exposed to possible harmful social media content.

### ***Hypothesis 1***

First, the proposed study hypothesizes that exposing athletes to negative social media content about their ability/performance (i.e., social evaluative threat) will trigger a stress response, resulting in increased post salivary cortisol levels.

*Hypothesis II*

Given the inverted U-shape relationship between stress and performance, it is difficult to make specific predictions about the impact of stress on athletic performance. It is predicted that fear of being negatively socially evaluated will moderate the relationship between cortisol reactivity and athletic performance; such that the impact of negative social media content will lead to higher levels of stress reactivity in players who are more fearful of this type of evaluation, resulting in lower performance scores compared to the participants who are less fearful.

## Method

### Participants

Eight female players of the CCAA college women's basketball team at Cal Poly Humboldt participated in the study ( $n = 8$ ). The athletes were between 18 and 22 years of age ( $M = 20.5$ ,  $SD = 1.69$ ). All participants stated to be non-smoker and not using hormonal medication. The subjects were informed that the study's target is to investigate the impact of social media on sports performance. After consent was given the students took part in a single session which lasted approximately 1 hour.

### Procedure

Athletes were advised to avoid smoking, eating, brushing teeth, or drinking anything other than water for at least 1 hour prior to the test session. They were asked to refrain from drinking alcohol for at least 12 hours prior to the test session. During the pretest phase the athletes were asked to rinse their mouth with water, which is part of the standard salivary collection protocol to ensure clean, usable samples are obtained. After a 10-minute warm up period, a baseline saliva sample was taken using the passive drool technique. This non-invasive technique allowed participants to collect saliva in their mouth which was then spit into a collection tube. Next the players were asked to shoot 40 free throws, from the free-throw line, and the research assistants recorded the shots made versus missed attempts at this baseline performance test. Following the baseline measurements, participants were asked to view social media posts on a tablet, which they were told were made about the basketball team this season. In reality, the participants were shown 10 experimenter-generated posts that negatively evaluated their performance

(e.g., “*too bad #23 can't shoot for shit; Wow @humboldtwwb #23... more of a slumberjack than a lumberjack, My blind grandmother does a better job than CalPoly's #23*”) and 10 experimenter-generated filler posts that were about the team generally and were relatively neutral in content (e.g., “*Love the energy at the game tonight @humboldtwwb*”). The posts shown to each athlete were identical, except the jersey number of the athlete was changed so that the player got the impression that the posts are about themselves specifically. Due to the time-course of salivary cortisol reactivity (Mascret et al., 2016) there was a 15-minute waiting period. During this time the participants were asked to complete a demographic questionnaire and the brief fear of negative evaluation scale (Leary, 1983). Approximately 15 minutes ( $M = 14.6$ ,  $SD = 2.8$ ) after the stressor was presented the second saliva sample was taken and the athletes performed another 40 free throw shots. Following completion of the study participants were fully debriefed as to the purpose of the study and informed that the social media posts presented were created by the experimenter and not from real people.

## **Measures**

### ***Athlete's Performance***

The study used standard NCAA basketball equipment and followed the NCAA rules and regulations. The athlete's baseline performance was determined by using the summed scores out of 40 free-throw attempts. After each shot attempt the player was supplied with another ball.

### ***Salivary Cortisol***

As a measurement of stress, salivary cortisol was assessed using the non-invasive passive drool technique. Each athlete provided a saliva sample at t1 and t2 in a separate test tube which were coded with a unique identifier (e.g., BB1, BB2, etc.) that is not linked to the player's identity in any way. All samples were stored on ice and afterwards transferred into a freezer (- 20 Celsius). The Salivary Cortisol ELISA RUO kit was used for the samples, which were analyzed in duplicate, and the mean value taken as reference. There was one exception of this procedure because the saliva sample was not sufficient in quantity to be duplicated, we used the value of the single analysis. The intra-assay coefficient of variation between the samples was 6.39 %, therefore under the recommended limit of 10%.

### ***Negative Social Media Content***

The participants were shown experimenter-generated posts that negatively discussed athlete's earlier performance (e.g., "*too bad #23 can't shoot for shit; Wow @humboldtwwb #23... more of a slumberjack than a lumberjack; My blind grandmother does a better job than CalPoly's #23*"). Each athlete read identical posts which differed only by the jersey number of the player. In addition, the athletes were asked not to comment (talk) to peer players about the content of the social media post until the study was finished.

### ***Brief Fear of Negative Evaluation Scale (BFNE)***

The BFNE is a valid and reliable 12-item measure to assess anxiety related to negative social evaluation developed by Leary (1983). The scale contains 8 straight-

forward questions e.g. *I am afraid that others will not approve of me; I am usually worried about what kind of impression I make, etc.* and 4 reverse coded questions e.g. *I am unconcerned even if I know people are forming an unfavorable impression of me; Other people's opinions of me do not bother me* (Leary, 1983). The answers were scored on a 5-point Likert type scale anchored as follows: 1 (*Not at all characteristic of me*), 2 (*Slightly characteristic of me*), 3 (*Moderately characteristic of me*), 4 (*Very characteristic of me*), and 5 (*Extremely characteristic of me*). The 4 reverse coded questions were reverse scored. All responses were averaged together. The higher score reflects a higher level of fear being evaluated.

## Results

### Preliminary Data Analytics

The data for each of the measured variables were checked for outliers, normality, kurtosis and if the distribution was skewed in any direction or showed unusual patterns using univariate statistics and scatterplots. All data were analyzed using R version 4.3.0.

### Hypotheses Testing

#### *Hypothesis I Analysis*

We conducted a one-tailed Welch two-sample t-test to determine if exposure to negative social media increased cortisol levels. The results were inconclusive, and we cannot conclude at this time that the social media posts had any influence when comparing cortisol levels at baseline (t1) and post-test (t2). ( $t(11.78) = 0.51, p = .31$ . *Cohen's d = .23*).

#### *Hypothesis II Analysis*

To determine if fear of being negatively socially evaluated impacts the relationship between cortisol reactivity and athletic performance, we ran a moderation analysis. A difference score was calculated for cortisol levels at baseline (t1) and post-test (t2) by subtracting t1 from t2. Therefore, higher values indicate a greater cortisol reactivity. A difference score was calculated for the number of shots made at baseline (t1) and post-test (t2) by subtracting t1 from t2. Positive scores indicate an increase in performance versus negative scores reflect performance decrease. We performed regression analysis with athletic performance as the dependent variable and cortisol reactivity as the independent variable. BFNE scores were included as an interaction term

in the model and simple slopes analyzed. Taken together the variables did not predict performance differences,  $R^2 = .10$ ,  $F(3, 4) = 0.14$ ,  $p = .92$ . Neither the change in cortisol ( $b^* = -0.06$ ,  $p = .91$ ) nor the level of fear ( $b^* = -0.05$ ,  $p = .93$ ) related significantly to athletic performance. Furthermore, there was no interaction ( $b^* = 0.50$ ,  $p = .55$ ) between cortisol levels ( $M = 0.05$ ,  $SD = 0.24$ ) and the BFNE scores ( $M = 2.86$ ,  $SD = 0.71$ ).



### **Discussion**

The aim of this study was to investigate if negative social media content potentially has an influence on athlete's cortisol levels as well as on their follow-up performance. The variables of interest were the change in cortisol and the difference in free throw performance, both analyzed based on prior research findings. We expected the negative social media postings would increase the stress experience of the student athlete resulting in higher cortisol levels, consequently leading to lower performance. The subject's cortisol levels, and their basketball free-throw performance were measured before and after the presentation of the social media postings. In addition, the participants filled out the Brief Fear of Negative Evaluation questionnaire (Leary, 1983) to see if greater predisposed fear interacts with the biological stress response.

Neither the predicted change in stress response was significant nor did the negative postings have a significant negative influence on the performance. The results showed 62.5% of the participants had increased cortisol levels after reviewing the social media posts, nonetheless their performance seemed not to be impacted. The fear being negatively evaluated did not interact with the cortisol level of the athlete and was not correlated to the performance outcome. These findings were not consistent with our initial predictions and deviated from prior research.

The results contradict studies who found elevated cortisol levels in athletes which experienced high levels of social-evaluative threat or high levels of predisposed fear of negative evaluation (Rohleder et al., 2007; Shirotaki et al., 2009). In addition, the outcome opposes Hostinar et al. (2015) results where the cortisol stress response was

especially high in people who received negative feedback of their performance. Notably, Hostinar et al. used the Trier Social Stress Test (TSST), a well-established powerful tool in psychological research to induce stress. The high accuracy in free-throw shooting of the athletes at both measured time points despite their level of fear, contradicts findings where athletes with higher FNE scores showed lower performance than subjects with lower FNE scores (Mesagno et al., 2012). Nonetheless, the free-throw performance aligns with prior results (Epting et al., 2011; Mascaret et al., 2016) which both showed similar non-significant differences between pre- and post-performance. The results highlight potential complexities in the underlying mechanisms of the relationship between social evaluation, cortisol response and athletic performance.

### **Limitations and Future Directions**

There are several limitations which need to be addressed. First, the sample size ( $n = 8$ ) is extremely small and limits the possibility of significant findings. A sensitivity analysis performed in R for the t-test and the linear regression showed a power of .05 (5%) to encounter a significant difference in the sample. Commonly a power of .8 or greater is recommended to find significant variances (Cohen, 2016). In the case of this study, it would have needed a far greater sample ( $n > 60$ ) to decipher differences that possibly exist. The small sample size is due to the fact that only players of the Cal Poly's women basketball team participated, which also eliminated a between-group comparison of the biological sexes.

A possible explanation for the rather minimal changes in cortisol after the stressor was presented could be the experimenter generated social media postings. Despite the

negative comments being personalized to each participant by using their jersey number, the date of the postings reflected season games which were played up to six months earlier. Some of the players might have played only a couple minutes, participated not at all in the actual games, or performed outstanding; these reasons could have decreased the social evaluative threat of the comments. Furthermore, the postings did not include racist hate speech, sexist slurs, target personal attributes or threaten the well-being of the players, to adhere with ethical standards in psychological research. However, such comments reflect the real-world of social media tweets more realistically, which a recent review study about online hate and sport documented (Kearns et al., 2023). In addition, the neutral postings (e.g., "*Love the energy at the game tonight @humboldtwwb*"; "*Come on @humboldtwwb, let's break the streak. You got this ladies!*") may have been seen as social support by the athletes, which can help to cope with negative comments (Kristiansen et al., 2011) and create a supportive environment which leads to improved athletic performance (Epting et al., 2011).

The performance measurement in form of free-throw shooting in a non-competitive setting cannot be compared to a competitive in-game situation, therefore may not be challenging enough for the athlete to create pressure to perform. The participants were also not exposed to a direct evaluative situation, nor were the social media comments evaluating the free-throw performance itself, which may have prevented a greater stress response and led to pre- and post-performance scores being stable. Furthermore, the stress/performance relationship is not a straightforward concept, rather than simply differentiate between healthy and unhealthy amounts of stress like the

inverted U-hypothesis recommends, it is a more subjective experience. The sport psychologist Hanin (1997) proposed a different, more complex model: The Individualized Zones of Optimal Functioning (IZOF). The IZOF model considers the optimal level of anxiety varies among individuals and is not a fixed point but rather a range situated along the continuum of state anxiety. It assumes emotions are elicited based on an individual's evaluation of the likelihood of achieving important goals. Sports involve repetitive activities, emotional experiences in specific situations gradually develop into consistent emotional patterns. These emotional patterns are unique to each person, task, and context (Ruiz et al., 2017). In regard to the current findings, this could explain for example why athletes with high fear of negative evaluation showed high performances, because they are familiar with the task and used to the situation. Participants which have experienced negativity on social media before, may not show increased stress response and are still able to perform well.

The unexpected results indicate the need for further investigation. Future research should consider using a more complex task to measure athletic performance. For example, a combination of three-point shots and free-throws including a time limit to complete the exercise. Overall, individual sport athletes e.g., track and field, gymnasts, etc. may be the better population sample, because their individual performance can be measured more reliably in competition and during practice than team sport athletes. Team athletes face several confounds which cannot be reliably separated from the manipulated stressor, for example they may experience stress from the ingroup pressure to perform

rather than from the negative evaluation on social media. A team athlete's performance depends also more on other team member's as well as on the opponent's performance.

In addition to the costly salivary cortisol tests as the only measurement of stress, heartbeat and blood pressure monitoring could give additional information about state anxiety, without overly inflating the research budget. Social media postings used as a stressor should reflect on actual performance of the individual and follow directly after an event to increase the evaluative threat. It is essential to emphasize that a more diverse sample is required in order to evaluate whether certain groups exhibit specific vulnerability to negative feedback or display greater variance in their stress response.

### **Conclusion**

The aim of this study was to highlight the influence of negative social media on athletic performance. We hypothesized that cortisol stress response would increase after athletes would be exposed to negative postings, and negatively correlate to performance. The results did not support our predictions. Given the significant influence of social media as a communication tool in today's societies, further research is necessary to assess the potential adverse effects and to devise strategies aimed at safeguarding athletes from these potential threats.

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