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Testosterone Reactivity is Moderated by Relationship Compatibility

Florencia Iturri
University of New Orleans

Testosterone Reactivity is Moderated by Relationship Compatibility

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Florencia Iturri

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Abstract:

Testosterone levels change in response to a variety of social situations including, sexual and challenge situations. Yet, little is known about the role of testosterone dynamics in in young adults in romantic relationships. Furthermore, the effect of compatibility of the relationship dyad on testosterone reactivity in response to social-challenge is unknown. Prior studies suggest that attachment levels may predict testosterone responsivity during stressors such as social challenge. What is missing from the literature is whether testosterone response to social-challenge is specifically modified within the confines of an attachment relationship, such as within romantic couples. I measured salivary testosterone in healthy romantically involved young adult couples in response to a examined romantic couples during a standardized laboratory stressor in the SPIT lab. Testosterone was measured repeatedly from saliva in both members of each dyad and assayed using an enzymeimmunoassay. Participants completed questionnaires measuring perceived relationship commitment, support, satisfaction, and passion. This was collectively described as relationship compatibility. I revealed that participants in romantic relationships showed significant testosterone response to the Trier Social Stress Test (TSST). Testosterone levels of the participant were moderated by testosterone levels of the supporter during the social-challenge, such that the supporter's response was coupled with their partner's testosterone response to stress. When the couples reported high-compatibility, their testosterone profiles were more coupled than for couples reporting low-compatibility. Findings fit within the challenge hypothesis and extend it in interesting ways. Testosterone may help an individual confront a challenge, and, more interestingly, testosterone may help a couple confront a challenge together.

Keywords: Testosterone, Relationships, Compatibility, Commitment, Social Challenge

Introduction:

When most people think about testosterone they think of the sex hormone, and aggression. While testosterone is directly related to both it is not always in the most obvious ways. In order to understand testosterone we must first debunk some of the common myths associated with it. If we were to believe all the advertisements on TV about testosterone we would assume that we have a fixed level of testosterone in our body. High testosterone would therefore equate with high sexual function, aggressiveness, and masculinity. Low testosterone on the other hand would result in low libido, meekness and feeling tired, and consequently men should want high testosterone all the time. However, this folk understanding of testosterone and aggression is unfounded in the scientific literature (Mazur & Booth, 1998). Thus, while people do have a base level of testosterone it does not matter if that level is high or low, as long as it is within the normal testosterone parameters. Furthermore, within the normal range levels of testosterone fluctuate dramatically throughout the day, so it is very difficult to classify someone as high- or low-testosterone without taking the current context into account.

These fluctuations in testosterone are also meaningful as testosterone changes in order to accommodate all of our different behaviors and contextual influences. That is, in a context in which aggression is called for, testosterone will change to meet the demands of that environment. This, as Sapolsky explains, is because aggression causes testosterone levels to increase. Average levels of testosterone can't help us predict things such as aggression if they are taken out of context (Sapolsky 1998). Within a single day testosterone levels are likely to increase when preparing for a fight, sexual encounter or a social-challenge. It is therefore important to think about testosterone as a component that is both affected by the environment and that can have an effect on our behavior.

Compared to the well-established relationship between testosterone and aggression in non-human mammals, meta-analyses examining the relationship between testosterone and aggression are weak in humans (Book, Starzyk & Quinsey, 2001). Sapolsky (1998) concludes that The trouble with testosterone is that the hormone is linked to the situation and situations can be complex. Wingfield and colleagues (1990) postulated the challenge-hypothesis which argues that testosterone isn't involved directly with aggression; rather, it is involved in the perception of a challenge situation to which aggression might be the best answer. Testosterone does not cause aggressive behavior: it simply enhances it in the right situation. Thus, the effects of testosterone can change across contexts (i.e., the hormone shows reactivity), and this response may be meaningfully linked to the situation in which the hormone is measured. Furthermore, Wingfield and colleagues (1990) argue that people have a higher testosterone response when faced with a situation that challenges their social status or mating abilities. Research that finds testosterone reactivity to sports competition is consistent with the challenge hypothesis (Bateup et al, 2002). Prior research has found that testosterone was reactive to a laboratory-based stressor, suggesting that some types of stress exposure may be viewed as a challenge (Schoofs and Wolf, 2011). In sum, testosterone can change in response to contexts and this response can be informative for how salient or important that context is for this sex hormone.

Building from the challenge hypothesis, a challenge that contains a social effect of testosterone, and therefore may change testosterone, is a context with motivational cues of sex and power (Mazur & Booth, 1998).This further illustrates the idea that testosterone will react to specific situations. For example, if one is simply walking along a sidewalk alone, there is no challenge, sexual desire or power struggle; consequently, since there is no perceived challenge testosterone should remain at base levels for that specific individual (Sapolsky, 1998). On the

other hand, if the same individual is in a sexually-charged setting and they perceive a challenge, testosterone levels would peak helping them engage in the challenge. The output of this situation might lead to aggression as the appropriate response to the challenge; the subsequent aggression would further increase testosterone levels. This example shows that testosterone does not cause aggression, rather; it enables us to perceive challenges and to react in a manner appropriate to the situation.

Testosterone fluctuate throughout the day, but what causes some of these fluctuations? Looking at the Sapolsky's ideas, aggression causes higher levels of testosterone (1998). He states that base levels of testosterone do not predict aggression but levels of aggression will predict levels of testosterone. Therefore, it follows that testosterone reacts to challenges. For example, in the study conducted by Van Honk and colleagues (2011) testosterone was administered to women showing once again that it was the change in testosterone levels that enabled the change in behavior. In the case of Van Honk (2011) the testosterone was artificially increased by giving participants testosterone, but in normal environment testosterone would be reacting to the environment. The way participants react to a laboratory social-challenge and the compatibility scores reported, moderates and predicts the physiological response experienced.

Testosterone is often examined in relation to aggression, but it is more broadly discussed as a social hormone in humans (Van Wingen, et al, 2011; van Honk, et al, 2011). An emerging literature is examining testosterone levels in family relationships (Kuzawa et al, 2010; Kuzawa et al, 2009). Yet, little is known about the role testosterone responds to social challenge in the context of the social support provided by being in a romantic relationships. Booth and colleagues (2003) found that relationship quality can moderate testosterone release in parent-child relationships. He further found that the link between testosterone and risk behavior and

depression was dependent on the quality of parent– child relations. This means that the relationship between parent and child influenced the effect that testosterone had on a child's development, and the hormone merely reflected how the relationship dynamics unfolded across the child's development. Similarly, Bateup and colleagues (2002) examined testosterone reactivity to a woman's rugby competition and found testosterone reactivity was not mediated by the outcome of the game, which would have suggested the hormone was somehow influential in helping how the participants played rugby. Testosterone levels in woman rugby players did not predict a measureable effect on performance but did predict player's perceptions of teamwork and social bonds (Bateup, Booth, Shirtcliff & Granger, 2002). Iturri and colleagues (2013) analyzed testosterone reactivity to a stress task in relation to individuals' perceived social support. Young adults who reported a high quality social support network and high satisfaction with their support network had greater testosterone reactivity under laboratory stress than those who reported low quality social support or low satisfaction with social support (Iturri, 2013). Collectively, this literature suggests that testosterone may be related to social behaviors, including social support in important relationships. The current study aimed to determine whether relationship compatibility can be a moderator for testosterone response to social-challenges.

These studies suggest that testosterone is linked with relationship compatibility and not simply a response to social challenge. This viewpoint emphasizes the adaptive purpose of testosterone to help the individual (or couple) manage and succeed during a challenging context, and how relationship compatibility moderates testosterone in this environment. I anticipated that couples with higher compatibility would face the challenge together, even physiologically. One study examined testosterone and marital satisfaction, and discussed the fact that testosterone was

not directly related to marital satisfaction (Booth, Johnson & Granger, 2005). Rather, other factors were more directly linked with testosterone such as relationship overload. This makes sense with the challenge hypothesis in that relationship overload may be perceived as stressful and testosterone is reactive to that stressor or challenge. Testosterone reactivity in response to the laboratory social-challenge is moderated by the couple's compatibility. As noted previously, Iturri and colleagues (2013) reported that people in relationships with greater perceived satisfaction with their social support system had higher testosterone reactivity levels. These findings match the idea that a relationship that exhibits high social support that is undergoing stress would show high testosterone reactivity. High testosterone reactivity is indicative of an effective response to social-challenge. Therefore it would follow that couples that have an effective response to social stress, and therefore high testosterone reactivity, might be better at dealing with stress.

When looking at relationship success it is important to take into account the many different factors that add up to the whole of the relationship. It is how these factors work together that help determine if a couple will continue their commitment or if the relationship will dissolve. According to Le and colleagues (2010) there are two major categories into which predictors for relationship dissolution can be split, these are: relationship factors and external factors. External factors refer to factors such as approval of friends and family. Whereas relationship factors refer to things pertaining directly to the relationship, such as: relationship satisfaction, commitment, love, and interaction between partners amongst others. This study, which looked specifically at unmarried couples, discovered that relationship factors were stronger predictors for relationship dissolution than external factors (Le, Dove, Agnew, Korn & Mutso, 2010). When looking at the specific questions designed to assess relationship factors one

can see that they closely match the questions used to assess social support - the main difference being the romantic aspect of the first kind of relationship- thus linking high social support with "good" relationship factors such as high relationship satisfaction. Therefore it is possible to separate couples into those that report high quality support or high relationship satisfaction from those showing low quality support or low relationship satisfaction. For the purpose of this study, couples showing high quality support or high relationship satisfaction will be referred to as high-compatibility couples; whereas, couples reporting low quality support or low quality relationship satisfaction will be referred to as low-compatibility couples.

Finally, it is important to understand if there is a trend in the common base levels of testosterone. My contention is that testosterone must be evaluated within the environment to understand the relevance of the environment. The Trier Social Stress Test (TSST), is a well-established method of inducing social stress and elevates salivary testosterone in young adults from basal levels used for our laboratory social-challenge, mimics real life social-challenges. Thus by placing the couple in this situation we attempted to replicate an environment of social-challenge. A comparison in testosterone for the participant on a basal day to the participant's testosterone on lab day shows that the TSST is in fact a social-challenge (Iturri, Phan, Dismukes, Shirtcliff, 2013).

One study found that married and non-married men in stable relationships had lower baseline levels of testosterone compared to single men (Burnham, Chapman, Gray, McIntyre, Ellison & Lipson, 2003). This fits with the interpretation that testosterone is adaptive and serves a purpose as a reaction to the environment especially in terms of mating ability and dominance. Evolutionarily speaking the married man has won; he has no need to keep asserting dominance on a constant basis because his social status is relatively stable. Therefore on average lower

testosterone levels make sense. Similar findings were presented for people that have high social support levels (Iturri, Phan, Dismukes, Shirtcliff, 2013). It is important to point out that the study by Iturri and colleagues showed greater testosterone reactivity to the stressor in people who reported higher social support, suggesting that the link between base testosterone versus testosterone level can be divergent. This matches the challenge idea in that testosterone changes are dependent on the context, and this hormone reactivity may be adaptive.

Based on the findings of Burham and colleagues, and the challenge hypothesis, it was my belief that individuals in romantic relationships would (both) show testosterone reactivity to a stressor as they would view the experience as a challenge. More interestingly, I was interested in whether couples' testosterone levels were similar, or coupled, to one another suggesting that they confronted the challenge together. Similar testosterone reactivity would indicate that both people in the relationship identify challenge in the same situations, allowing them to better engage in the situation together. Furthermore, a good relationship would be indicative of high social support which is related to higher testosterone reactivity under stress. It thus follows that if the relationship is not offering adequate social support this could be seen in the participant's testosterone reactivity levels. All couples go through stressful situations and it is in part their ability to overcome these events that will affect if they continue in their relationship. Bateup found that reactivity in challenge situations was related to feeling bonded which further drives the point that it is appropriate for strong couples to have high testosterone reactivity to stress, and that their testosterone response is coupled. The more bonded they are the more prepared they will be to engage in the challenge situation. These same findings are not expected for base testosterone levels although these will be explored to clarify the reactivity findings.

The purpose of this study is to determine whether relationship compatibility has an effect on testosterone. It is expected that the participant that underwent the stress challenge will have higher testosterone reactivity than the supporter participant because the active participant was actually going through the stress test. Nonetheless, I expected that the supporter would also show a reaction because their partner is being challenged. For high-compatible couples, testosterone release during the challenge was expected to be higher than for low-compatibility couples in the same position. High quality support would enable the high-compatibility couple participant to fully engage in the challenge at hand. For the supporter, who is both the giver and receiver of support, the challenge presented to their partner would more likely be perceived as a challenge to the unit. In order to fully engage in said challenge, their testosterone levels would also increase - albeit at lower levels than the participant. It is important to distinguish therefore that by submitting subjects to stress in a laboratory setting testosterone reactivity would more keenly reflect those of a stressful day in the couple's life than a normal day. Thus, low testosterone reactivity to an induced stressor would reflect that couples do not have an efficient engagement to each other or to providing support to one another in the stress situation.

I hypothesized that testosterone would be reactive to the TSST as a form of social-challenge. I further hypothesized that the participant's testosterone would be related to the supporter's testosterone as captured during the TSST. Finally I hypothesized that this coupling of testosterone would be more evident in high- compatibility couples.

Design: Methods

Data for this experiment was collected by the Stress Physiology in Teens Lab (SPIT Lab) during a TSST Couples Study.

Participants

These include couples between the ages of 18-32, that had been together at least a year, where both partners were willing and able to come to the SPIT lab and where one member underwent the Trier Social Stress Test while the other person (supporter) watched the stressor from the adjacent room.

At the time of the study the couples were given a choice for being either the participant or the supporter for the experiment. Both answered the same questions about themselves, their habits and relationships. After an hour the participant was asked to prepare a five minute speech applying for their dream job which they were told would be scored by a panel of judges. The judges were confederates instructed to keep the participant talking for five minutes, without offering feedback. After the speech the participant was asked to perform a mental math task, and was immediately informed of wrong answers and made to restart every time wrong answers were presented. During this time, the participant was filmed and the supporter was able to watch their performance but instructed not to offer feedback until the task had ended. The task was designed to stress the participant and to observe the reaction of the supporter.

Salivary Cortisol Measures

Six saliva samples were collected for the participant. The first sample was collected when the couple first arrived at the lab at approximately 14:00. The second sample was collected 10 minutes after the task instructions were read to them. The third sample was collected immediately after the stress test. The fourth saliva sample was collected 20 minutes after the stress test. Sample five was given by the participant only and was collected 20 minutes after the previous sample. Sample six was given by the participant only and was collected 40 minutes

after the previous sample. The supporter provided samples 2, 3 and 4 only to minimize cost and participant burden. The present study is limited to these three parallel samples which are most closely adjacent to the stress context.

Saliva was collected by passive drool (Shirtcliff, Granger, Schwartz, & Curran, 2001). Samples were immediately frozen at -80^{o}C until they were aliquotted to minimize freeze/thaw cycles. Enzymeimmunoassays were completed at the University of New Orleans SPIT lab using commercially-available Salimetrics kits (State College, PA). Samples were measured in duplicate; duplicates that varied by more than 7% were repeat-tested. The range of sensitivity was from 1-600 pg/mL. Average intra- and inter-assay CVs were 4.6% and 8.3%, respectively.

Psychological Measures

At the time of the TSST Couples Study both the participant and supporter were given surveys to fill out. Questions on these surveys included several different measures including factors relating to their current relationship, risk attitudes, health and life events amongst others. The questionnaires about their current relationship covered several different aspects of the relationship including: social support, passionate love scales, intimacy, commitment, love attitudes, communication of emotions, and relationship satisfaction.

In order to be able to compare all of these aspects of relationships we used principal component analysis (PCA). PCA compares whether these items are inter-correlated, and creates an omnibus factor score. PCA is useful for reducing the number of scales needed to capture social support by combining items into overarching factors or composite scores that explain variance in the initial scales. The first principal component accounted for 44% of the variance in

relationship compatibility, and was comprised of all items on the triangular love scale. For this metric, higher values on the PCA of the TLS correspond to higher levels of compatibility.

Statistical Procedures:

After using PCA to differentiate compatible couples from incompatible couples, I looked at the testosterone reactivity of both the participant and the supporters of each couple in relation to their compatibility scores. The testosterone data used is constrained to samples 2, 3, and 4 for both the participant and the supporter as they are the only co-occurring samples. Analyses were conducted using Hierarchical Linear Modeling. I looked at whether testosterone changed in the participant to test the first hypothesis that testosterone would be reactive to this social challenge. I then examined the relationship between the participants and supporter testosterone levels during the TSST to test my second my hypothesis. Most importantly, I then examined whether relationship compatibility factor scores predicted the dependent variable, testosterone, and the within-couple correlation of the participants' testosterone with their partner's testosterone. It is my hypothesis that compatible supporters will show greater testosterone reactivity to observing the stress test than incompatible supporters.

Results:

Hierarchical Linear Modeling was used in order to account for the nesting of testosterone samples within an individual (and of their partner's testosterone with their own). This regression technique allows us to ignore the assumption of homogeny of variance within the testosterone data. Data was grand mean centered in SPSS before entering into HLM. Initially an intercept only model was run, according to the steps laid out by Hox (2002). In this model 94% of the variance for testosterone was explained by differences between participants. Testosterone

reactivity for the supporter was determined using tubes 2, 3 and 4 and was found to be not significant, p>.05, suggesting that the partner on average did not show testosterone reactivity to the partner going through a stressor. To determine whether there was testosterone reactivity, tube number (2, 3, 4) was included as a within-individual predictor of the participant's testosterone. This showed that testosterone levels were above zero, B=4.38, p<.001, and (more importantly) that testosterone levels rose over time, B=.048, p<.025. This is consistent with our prior report across all six samples that testosterone reactivity is apparent within participants undergoing the TSST (Iturri et al, 2013).

Next, I examined whether there was an effect of gender on testosterone levels in the dyad. The average level of testosterone without accounting for gender is 3.19 (p<0.001). Gender significantly loads onto the base model (in this case the intercept only model) (B=0.93, p<0.001). This means that, on average, men's' testosterone level is 0.93 higher than the sample average, and girls' testosterone level is 0.93 lower. With gender and tube in the model, testosterone reactivity, B=-.019, p=.75, and gender, B=.047, p=.25, were no longer significant, suggesting that these are overlapping effects or that I do not have sufficient statistical power to disentangle both gender and reactivity patterns. Consequently, subsequent analyses test a more parsimonious model in which tube is not a predictor of testosterone but rather testosterone levels during the stressor are allowed to fully fluctuate.

Next, I wanted to see if supporter-testosterone was a predictor of participant-testosterone. Supporters' testosterone has an inverse relationship with the participant testosterone (B=-0.09, p=0.044) suggesting that at moments in which the participant had high testosterone, their supporter had low testosterone.

Although testosterone levels of the participant were inversely related supporter's testosterone level during the TSST, this was not true for all couples. The relationship between the supporter testosterone level and participant testosterone level was moderated by relationship compatibility, such that supporters who answered highly on the TLS had significantly less decoupling between supporter and participant testosterone levels (B=-0.931, p= 0.032). That is, moments in which the participant had elevated testosterone, their supporter's testosterone was similar to their own within the most compatible couples. We further found that within high-compatibility couples when the supporter was a male testosterone levels of the couples were significantly coupled (B= - 0.685957, p= 0.020).

To further understand relationship compatibility, I focused specifically on the commitment subscale of the triangular love scale as a level-2 moderator of supporters' testosterone in the prediction of participants' testosterone. As was the case for the principal component analysis of the TLS, this variable decreased the amount of de-coupling between participant and supporter testosterone at the trend level (B=0.20, p=.062). Although not as strong as the global measure of relationship compatibility, results suggest that the commitment within a relationship may drive the observed effect in which testosterone levels are more highly coupled within committed romantic partners.

Discussion

I examined whether testosterone release during a salient social context is related to relationship compatibility within romantic couples. Specifically, I was interested in whether a romantic partner experienced a parallel physiological response when their significant other went through a challenge, essentially experiencing the partner's challenge as their own. Results did

not simplistically support the hypotheses, but rather demonstrate further nuances with how testosterone operates within social situations. Each hypothesis is addressed in turn below.

My first hypothesis that looked at participants having a reaction to the TSST was partially supported. We found testosterone rose during the challenge, similar to other studies which have found testosterone is responsive to social stressors, and also consistent with the conceptualization of the challenge-hypothesis in which many contexts can be viewed by an individual as a possible challenge. This is consistent with some prior work that found testosterone rose during the TSST (Gerra, Zamovic, Zambelli, Timpano, Bernasconi & Brambilla, 2000), (Lennartson, Kushnir, Bergguist, Billig & Ionsdottir, 2012), although other literature does not find testosterone reactivity (Schoofs & Wolf, 2011). Testosterone reactivity for the supporters was not significant; this may be explained by the constraints in the amount of samples that we had available for the supporter. At the time of collection of the first sample the supporter and the participant had already heard the task, and therefore, the anticipatory reactivity of testosterone may have already begun. Consistent with this interpretation, the prior study that did not find testosterone reactivity to the TSST was limited to 25min around the duration of the TSST (Schoof & Wolf, 2011) Furthermore, different people have testosterone peaks at different times, and close inspection of the data shows that the supporter often peaked early in the task (often sample #2). Therefore, the three samples were not likely to capture enough time to fully represent the reactivity that was occurring as the individual's testosterone changed across the entire session. Instead, these three samples may be capturing the physiological activation to the challenge during the TSST. A second possibility is that the stressor was not salient for the supporter, since the supporter is only watching the stress task and not partaking in the task. This possibility was emphasized by Shoofs and Wolf (2011) who postulated the stressor may be too mild to cross the gonadal axis's

threshold for activation. The partner's physiological response to the task may be subdued. However, it is important to note that this subdued response was observed in the present study within the majority of supporters, but a subset did show elevations in testosterone levels (see below).

My second hypothesis was that testosterone levels for the supporter would significantly relate to testosterone levels of the participant. This hypothesis was supported statistically, but in the opposite direction as initially expected. Testosterone levels for participants and supporters were decoupled, or inversely related. This makes it seem like couples are physiologically out of tune when reacting to the TSST. However, since this finding is consistent we can also think of it as balancing each other out. Since all of the couples included in this experiment had been together for at least a year their scores for compatibility are negatively skewed as they have to be sufficiently compatible to have stayed in a relationship for over a year. However, taking this trend into account there are still couples who report higher compatibility through their answers to the TLS and the PLS. Testosterone patterns of high compatibility couples are significantly different than those of lower compatibility couples.

My third hypothesis was that the relationship between testosterone levels of the participant and supporter would be influenced by relationship compatibility. This hypothesis was also supported. Whereas overall the participant showed de-coupled or divergent testosterone levels from their partner during the TSST, this was not the case for the most compatible couples. Couples in which the supporter reports higher relationship compatibility showed more similar testosterone levels with their partner than couples with lower compatibility scores. In a sense higher reporting of commitment, love, and support by the supporter buffer the decoupling. Testosterone levels show that not only are the supporters self-reporting higher investment, they

are also more invested on a physiological level. This relates to other studies that found that in group competition scenarios it is bonding, and how well the team works together, that affects testosterone levels (Bateup et all, 2002).

There are a couple explanations for these finding. The first possible scenario is that high compatibility supporters are "more in tune" with the social challenges faced by their partners. They are more compatible, which includes values for commitment, and therefore physiologically they have a greater response to watching their partner undergo the social-challenge presented by the TSST. This explanation suggests that when an individual experiences a challenge such as the TSST, their partner also experiences that challenge with them. This explanation emphasizes that the participant, on average, experienced testosterone reactivity to the TSST, thus experiencing the context as a challenge. For the most compatible couples, this situation also crosses their threshold for showing a testosterone response despite the fact that it is their partner facing the challenge. The second possible scenario is that high-compatibility participants feel more support throughout the TSST even though their partner is in the other room. The presence and support provided by the supporter moderates the amount of social challenge perceived by the participant, so the context is not sufficiently experienced as a challenge by the participant. Within this explanation, neither the supporter nor the partner were expected to show testosterone reactivity to the challenge. This explanation is consistent with Shoofs and Wolf (2011) who emphasized that the TSST may be a mild challenge for the gonadal axis as may be the case when the presence of the partner buffers a testosterone response to challenge. This explanation is also consistent with Kuzawa and colleagues (2009, 2010) who found lower testosterone within romantic couples and parents as the gonadal axis appeared to be less easily activated within these romantically- or parentally- attached individuals. Either scenario would account for the milder

decoupling in high-compatibility couples that I observed. Furthermore it is highly plausible that both of these scenarios are in play and their effects are occurring and affecting the participant and the supporter at the same time.

These specific observations about testosterone have important implications for a broader literature on trust and love. Overall high-compatibility couples were more in tune with each other not only in terms of self-reported compatibility but also physiologically, suggesting that testosterone may instantiate, to a certain extent, the love and commitment that people feel to one another in romantic relationships. Within the compatibility scale, commitment was the biggest predictor for testosterone levels. This seems to indicate that compatibility is more than just feeling love for another person it is related to how committed we are to their outcomes. This is interesting considering that this hormone of desire and drive was related to commitment rather than self-reported passion or love. Other studies have found that men in committed relationships, and men who are active parents have lower levels of testosterone (Gettler,. McDade, Feranil & Kuzawa, 2011), (Gettler, McDade & Kuzawa, 2011). This begs the consideration that commitment to either a child or a partner significantly affects testosterone levels. This paper adds to our understanding of love and commitment by looking at how committed couples deal with stress; together at a self-reported and physiological level.

A further finding was that the coupling of testosterone between participant and supporter was even stronger when the supporter in high-compatibility relationships was male. This indicates that males have a greater physiological response to watching their girlfriends undergo social-challenge. Furthermore this could indicate that females are more reassured by the presence of their male counterparts; whereas, for male participants the desire to impress their girlfriends adds to the perceived social-challenge. Fully testing this hypothesis would require an interaction

between gender and compatibility which, unfortunately, the present study is not powered to test or able to with heterosexual couples. It will be interesting for future studies to determine whether the most compatible male partners confront a challenge for their partner physiologically.

Finally this paper extends the idea that a social-challenge can include a challenge faced by a loved one. This idea of vicarious reaction in terms of testosterone has been studied before when looking at the testosterone reaction of fans of a sports team when said team wins or loses (Bernhardt, Dabbs, Fielden & Lutter, 1998), and again with elections of political parties (Stanton, Beehner, Saini, Khun & LaBar, 2009). If the coupling of high-compatibility dyads is due to the supporters having a greater reaction to the challenge faced by their significant others, then this too is a type of vicarious reaction. It would be interesting to have more hormonal samples in order to really assess if the supporters are having a significant physiological reaction to this vicarious challenge. It is important to note that it is only high-compatibility couples that show this vicarious reaction. It is perhaps due to the level of commitment these individuals report. As with the sports and the political teams it is only individuals highly committed to their team or party that displayed a physiological response to a vicarious experience. Taken together with the present study, this research supports the idea that being committed and caring about an idea (or a person) can be nearly as physiologically meaningful as experiencing the event oneself. This type of vicarious or empathic response does not appear to be the norm, observed within everyone, but is characteristic of the most committed dyads.

Limitations and Further Research

One of the limitations of this study is that the only co-occurring hormonal data we collected covered only three samples. This meant that testosterone reactivity could not be

accounted for the supporter. Furthermore, we do not have a basal day hormonal data for the supporter which means that we cannot compare the effects that watching their partner go through the TSST has on the supporter. A second limitation is the number of participants; a greater sample size would give the study more power to, for example, explore interactions between compatibility and gender. A third limitation is found in the bias of self-reported romantic measures. When answering the Passionate Love Component questionnaire, the distribution was negatively skewed in which most couples reported highest scores. I believe this to be because of the type of questions presented. An example of the questions in the PLC is "I feel passionate about my partner". Participants seem to feel like there is a "right answer" to these types of questions, therefore an un-proportional amount of couples end up selecting the highest possible value for every question asked. At a physiological level, however, such passion does not appear to be reflected because testosterone is de-coupled across partners, on average. Furthermore, anecdotally, a follow-up with a subset of participants after 12- to 18-months showed that most of these couples had broken up and, presumably, no longer felt passionate about their partner. For a future study it would be useful to conduct a longitudinal follow-up with the couples that participated in order to see if there is a pattern in which type of couple is still together. This would help make further predictions about how relationship compatibility affects testosterone in the long term, and how in turn testosterone can predict relationship longevity.

In sum, the TSST seeks to capture the effects of a social stressor which can be interpreted according to the challenge hypothesis as a social challenge; the present study reveals that testosterone may be responsive to this social challenge, at least within individuals directly experiencing the challenge. This context is also salient for romantic couples in that testosterone release in the romantic partner was related to the participant's testosterone release as well.

However, it was not the case that couples reacted in a similar fashion during these social-challenges, but only within high-compatibility couples. This indicates that high-compatibility couples may be more invested both emotionally and physiologically in the social-challenges their significant others face. Since it is the relationship compatibility that moderates testosterone we can see how physiology is affected by and dependent on the environment.

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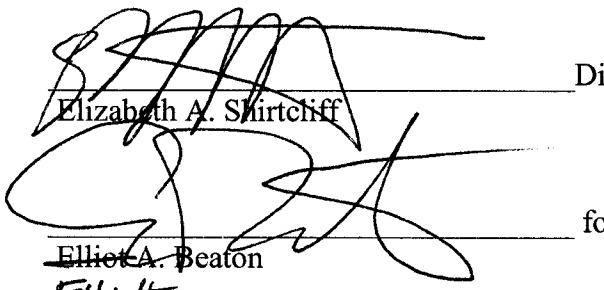
APPROVAL SHEET

This is to certify that Florencia Iturri has successfully completed her Senior Honors Thesis, entitled:

Testosterone Reactivity is Moderated by Relationship Compatibility



Elizabeth A. Shirtcliff — Director of Thesis

Elliot A. Beaton — for the Department

Abu Kabir Mostofa Sarwar — for the University Honors Program

May 1, 2014
Date