



Hormonal Response to Partner Exposure in Female-Female, Female-Male, and Male-Male Romantic Partnerships

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Abstract

Love, infatuation, and affection have long been the subjects of human fascination. They have inspired novels, musical and visual art, and even wars. We posit that these feelings of love and affection are, at their core, the cumulative manifestations of biological responses to prospective and current romantic partners. Such biological responses are linked especially to coordination of the hormone cortisol. Feelings of love and affection do not limit themselves to opposite-sex romantic partner pairs; indeed, they extend to female-female and male-male partner pairings. And so, ideally, biological responses to romantic partner exposure (opposite-sex and same-sex) should be similar amongst individuals of the same biological sex; that is, all females should have similar endocrine responses and all males should have similar endocrine responses to a romantic partner, regardless of the sex of their partner. The focus of this study is on hormonal activity in individuals in response to romantic partner exposure. This hormonal response is measured in salivary samples taken at and around the time of partner exposure. Saliva from these trials is analyzed for the stress hormone cortisol. Cortisol is a hormone associated with the feelings of stress and arousal. Some evidence shows that romantic partners display a link or synchronization in their cortisol functioning, which is identified as *cortisol attunement*. While some research has been done on these links, it has been done almost entirely in heterosexual couples. In order to paint a fuller picture, it is necessary to include same-sex couples in the research. Previous research also only gives a very generalized view of hormone function between romantic partners. It is the goal of this study to identify a series of specific hormonal snapshots related to partner exposure. In addition to biological markers, individuals in romantic partnerships are asked to provide information through questionnaires related to developmental and social experiences. This information can help us to make connections between developmental and social-behavioral influences and biology. Ultimately, this research will expand our general knowledge of how we as individuals and as romantic partners function. The information gained from this study can help us to better understand ourselves and how to improve our relationships.

Introduction

- Cortisol is a steroid hormone mediated by the Hypothalamus-Pituitary-Adrenal Cortex (HPA) Axis that is associated with both feelings of stress and arousal. Previous research suggests that cortisol also plays an important role in creating bonds between human (and non-human animal) individuals. In social species, like humans, social bonds are crucial to mental/emotional health.
- Researchers can detect changes in cortisol release through/with saliva samples. Salivary cortisol concentrations have been shown to correlate between non-human primate individuals [2], between human mothers and their children [3] [5] and between spouses [1]. This correlation between salivary cortisol concentration is explained by a phenomenon called *cortisol attunement*, in which there is a systematic synchronization of the HPA axis between close individuals.
- Existing research has observed cortisol attunement primarily by evoking a response through stress-inducing tasks, and in doing so it has failed to examine any base-level of attunement between close individuals. Existing related research has primarily observed mother-child and opposite-sex spousal relationships, and same-sex romantic partnerships have not been studied.
- The purpose of this study is to examine cortisol attunement between individuals in romantic partnerships as a function of being in the presence of one another, thus attaining a basal level of attunement. This study also seeks to include same-sex romantic partners in order to resolve a more complete understanding of human relationships and their biological foundations.
- We hypothesize that individuals in romantic partnerships demonstrate a basic level of cortisol attunement as a result of partner presence, and we further predict that individuals respond hormonally to their partners in a similar way to other individuals of the same sex, regardless of the sex of their romantic partner.

Materials & Methods

Recruitment. Twenty-two individuals participated in this study (11 female, 11 male). There were two female-female romantic partnerships, seven female-male romantic partnerships, and two male-male romantic partnerships. Individuals aged between 18 and 25 years and originated from Oklahoma (N=19), the West-South-Central U.S. (N=1), the East-South-Central U.S. (N=1), and the East-North-Central U.S. (N=1). Participants had neither a gonadal nor a thyroidal disorder.

Data Collection. Romantic Partners arrived at the study location together and were separated into separate, yet similar, rooms. Once separated, individuals were left alone for thirty minutes to complete a set of questionnaires including a demographic survey, the ACE-10 question survey, the Sociosexual Orientation Inventory, and the Adult Attachment Scale. At the end of this thirty-minute period, individuals donated a baseline saliva sample. After saliva donation, each partner was taken one at a time to a second location where they were reunited. Couples were then asked to take saliva samples at 15-minutes and 30-minutes after having been reunited.

Data Analysis. All collected saliva samples were assayed for cortisol, in order to assess for adrenocortical attunement. Information from questionnaires was also gathered and linked to saliva samples via a code system. Participation was confidential.

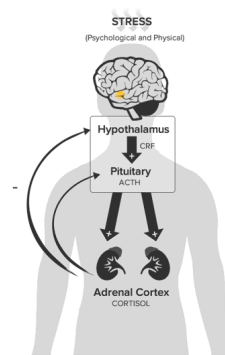


Figure 1. Illustration of the HPA axis. The Hypothalamus-Pituitary-Adrenal Cortex (HPA) Axis controls the secretion of cortisol in a negative-feedback system.

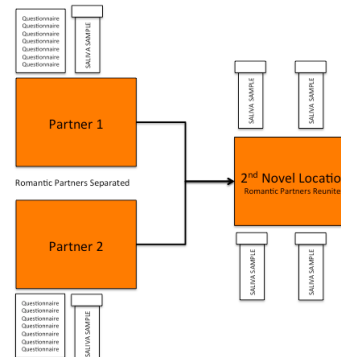


Figure 2. Diagram of Partner Movement and Data Collection. Upon arrival, romantic partners are separated for a thirty-minute period in which to complete questionnaires and after which to donate a baseline saliva sample. The romantic partners are then reunited in a new room where they donate saliva samples after fifteen and thirty minutes of exposure to one another.

Results

Statistical analysis indicates a correlation between the salivary cortisol concentration of partners after 15 minutes and 30 minutes of exposure to a romantic partner ($r = 0.61, p < 0.05$). Analysis of variance (ANOVA) shows no significant difference in this salivary cortisol concentration synchrony in regards to sexual orientation of the participant. Individuals who experienced more adverse childhood experiences were less likely to indicate a tendency towards long-term relationships ($r = 0.68$) (Figure 3). Adverse childhood experiences also correlated with sexual orientation at $r = 0.482$.

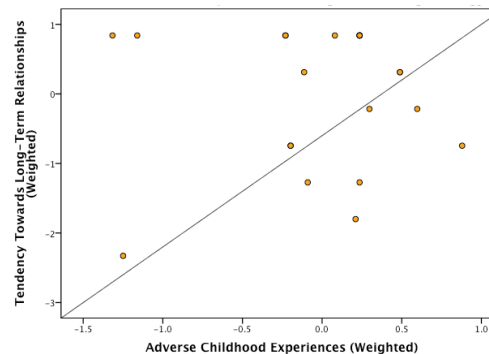


Figure 3. Adverse Childhood Experiences (ACE) and Tendency Towards Long-Term Relationships. ACE scores shown along the X axis are reverse scored such that lower scores indicate higher endorsement of adverse experiences during childhood. Independent of sexual orientation and other factors, individuals who report having experienced more adverse childhood experiences also report having less of a desire to engage in long-term, monogamous relationships.

Conclusions

- The present results support the concept of a base-level attunement or synchrony between the function of HPA axis of individuals in a romantic relationship, as viewed through salivary cortisol concentrations after exposure to one another.
- This demonstrated cortisol attunement is the same in opposite sex (heterosexual) and same-sex (homosexual) romantic partnerships.
- Individuals who experienced more adverse experiences (i.e. verbal abuse, physical abuse, etc.) before the age of 18 years were less likely to indicate a desire to pursue long-term relationships and in some cases indicated an aversion to a long-term mating orientation.
- Individuals who identified as bisexual or homosexual were more likely to have been abused before the age of 18 years. It should be noted that any notion of abuse leading to homosexual identity has been discredited, and that this correlation more-than-likely indicates increased childhood abuse as a result of biologically founded non-heterosexual identification [4].
- These results are preliminary, and we predict that further data collection will further support these conclusions.

Social Impact

The significance of this study is two-fold

- Our findings indicate that romantic partners in long-term relationships, regardless of sexual configuration (e.g. female-female, female-male, or male-male), are biologically connected/synchronized via the HPA axis. We can use this knowledge to better understand the nature of romantic relationships and how to make them stronger.
- Our findings indicate that childhood abuse and other adverse experiences can negatively impact an individual's ability to bond with their romantic partner and sustain long-term relationships in adulthood. We can use this knowledge to better inform social policy in regards to insuring the safety and well-being of our children.

Future Directions

- This study can be expanded to include more romantic partnerships in order to further elucidate the details of base-level attunement between couples via the HPA axis.
- This study can also be extended to include the consideration of other biological connections between couples, such as the function of testosterone.

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References

[1] Beck, L.A., Pietromonaco, P.R., DeBuse, C.J., Powers, S.I., Sayer, A.G. (2013). Spouses' Attachment Pairings Predict Neuroendocrine, Behavioral, and Psychological Responses to Marital Conflict. *Journal of Personality and Social Psychology* 105(3):388-424. [2] Kilar, C.W., Bettinger, T.L., Laudenslager, M.L. (2005). Salivary cortisol and behaviour in an all-male group of western lowland gorillas (*Gorilla gorilla*). *Animal Welfare* 14(3): 187-193(7). [3] Neu, M., Laudenslager, M.L., Robinson, J. (2009). Coregulation in Salivary Cortisol During Maternal Holding of Premature Infants. *Biological Research for Nursing* 10(3):226-240. [4] Rind, B. (2013). Homosexual Orientation—From Nature, Not Abuse: A Critique of Roberts, Elymoure, and Koenen (2013). *Archives of Sexual Behavior* 42:1653-1664. [5] Ruttle, P.L., Serbin, L.A., Rack, D.M., Schwartzman, A.E., Shireff, E.A. (2011). Adrenocortical attunement in mother-child dyads: Importance of situational and behavioral characteristics. *Biological Psychology* 88: 104-111.