Activitas Nervosa Superior Rediviva Volume 66 No. 4 2024

ORIGINAL ARTICLE

DOI: https://doi.org/10.31577/ansr.2024.66.4.2

Couple satisfaction was not related to the variability of AVPR1A gene but to the presence of children in the partnership

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Submitted: 2024-09-03 Accepted: 2024-11-18 Published online: 2024-12-19

Key words: **Arginine vasopressin; AVPR1A; Children; Couple satisfaction**

Act Nerv Super Rediviva 2024; **66**(4): 155–158 ANSR66424A02

Abstract

OBJECTIVES: The aim of our study was to investigate whether genetic variations in the Arginine vasopressin Receptor 1A (AVPR1A) gene or the presence of a child is associated with couple satisfaction.
METHODS: A total of 53 healthy volunteers (32 women) participated in this study. The average age was 28.7 years (SD = 8.7). All participants were required to have a relationship of at least one year with their partner. The RS3 microsatellite in the AVPR1A promoter region was genotyped. The couple satisfaction was evaluated by Couple Satisfaction Index questionnaire.
RESULTS: It was shown that the variability of the AVPR1A gene was not associated with couple satisfaction (p = 0.114), but childless participants had a higher level of couple satisfaction than those with children (p = 0.032, Cohen's d = 0.735).
CONCLUSION: However, it cannot be considered a causal relationship, these findings indicate the importance of non-genetic factors in the context of partner satisfaction. Our results suggest a link between the presence of a child and the quality of a partnership and attachment. This observation could have implications for behavioral research, as well as for awareness programs, education, and support services for parents.

Introduction

Arginine vasopressin (AVP) system is known to be associated with social behaviour, particularly in the context of pair bonding, trust, and emotional regulation (for a review see (Carter 2017; Heinrichs *et al.* 2009). The effect of AVP is mediated via Arginine vasopressin receptor 1A (AVPR1A), which is encoded by the gene of the same name. The level of AVPR1A expression in different brain regions of animals has been shown to be associated with various aspects of social behaviour (Hammock *et al.* 2005). While the regulation of AVPR1A expression is complex, a polymorphism in the promoter of this gene may be one of the factors involved in its regulation (Hammock & Young 2005). Humans do have three repetitive sequences of particular interest in this region that are polymorphic: A (GT)25 dinucleotide repeat, a complex (CT)4-TT-(CT)8- (GT)24 repeat (RS3), and a (GATA)14 tetranucleotide repeat (RS1) (Thibonnier

et al. 2000). Previously published studies have suggested a link between these genetic variations in the AVPR1A gene and differences in pair bonding and attachment behaviour in humans. The study focused on 7400 twins and their siblings, who had been in a relationship for at least a year, found a significant association between variants of the vasopressin gene and infidelity in women only (Zietsch *et al.* 2015). In men, there is an association between one of the human AVPR1A repeat polymorphisms (RS3) and traits reflecting pair-bonding behaviour, including partner bonding, perceived marital problems, and marital status, and it shows that the RS3 genotype of the males also affects marital quality as reported by their partners (Walum *et al.* 2008). In addition to genetic factors, various sociodemographic factors are significantly associated with marital satisfaction (Kowal *et al.* 2021). Interestingly, an international study showed that a higher number of children was associated with lower marital satisfaction only in the population of women, parents with higher education, and lower levels of religiosity (Kowal *et al.* 2021). Contrastingly, the same study also found that in some countries, a higher number of children was associated with higher marital satisfaction, but only for men.

The aim of this study was to investigate whether variability in the RS3 located in the 5′ flanking region of AVPR1A is associated to couple satisfaction regardless of marital or nonmarital, since limited research has explored this question. Complex behaviours including the partner's interaction are influenced by a variety of factors, including genetics, social environment, and psychology. Therefore, the impact of having children on relationship satisfaction was also investigated.

Sample and methods

Participants

A total of 53 healthy volunteers participated in this study, 32 women and 21 men. The average age was 28.7 years (SD = 8.7, range 19-50). Participants were mostly middle class, all of them were Caucasian. All participants were required to have a relationship of at least one year with their partner, no matter if they were married, unmarried, cohabiting together or not. The average length of the relationship was 6.7 years (SD = 5.2, range 1-21). Participants were evaluated as individuals not as couples. They were questioned about the presence of the children. Forty-one participants did not have a child, ten participants had 2 children, and two participants had 4 children.

DNA isolation

Approximately 2 ml of saliva were collected by spontaneous salivation into the collection cup. After centrifugation at 6797 g for 3 minutes, pellets were resuspended in 200 µl of PBS, and DNA was isolated using the silica based QIAamp DNA Blood Mini Kit (Qiagen, Hilden, Germany).

Genotyping

The microsatellite in the promoter region of AVPR1A (RS3, a complex (CT)4-TT-(CT)8-(GT)24 repeat, both upstream from the transcription start site) was genotyped. The RS3 microsatellite was amplified with primers 5′-TCCTGTAGAGATGTAAGTGC-3′ (forward) and 5′-GTTTCTTTCTGGAAGAGACT-TAGATGG-3′ (reverse) (Wassink *et al.* 2004). We also genotyped the RS1 polymorphism, but the results could not be evaluated, so we excluded it from the analysis. The fluorescently labelled DNA fragments were analysed by size with automated capillary electrophoresis by using an ABI PRISM 3730 Genetic Analyzer (Applied Biosystems). Successful genotyping of both alleles was obtained in 42 individuals.

Couple Satisfaction Index

The Couple Satisfaction Index (CSI) questionnaire (Funk & Rogge, 2007) was used to measure partner satisfaction in a Slovak language adaptation (Šlosáriková 2021). It contains 32 items consisting of a 6-point Likert scale (0-5), except for one item with 7 points (0-6). The raw score for partner satisfaction is calculated by summing all items, with higher scores indicating higher satisfaction. The maximum score is 161. The cut off for determining partner satisfaction is 104.5. The questionnaire was administered online.

Statistical analyses

Normal distribution was tested using Shapiro-Wilkov′s test. Differences in couple satisfaction between individuals with different alleles of AVPR1A gene were assessed through the Kruskal-Wallis test. Differences in partner satisfaction between participants with and without children were investigated using the Independent Samples t-test. Cohen's d was used to determine the effect size.

Ethical Statement

All procedures were performed in compliance with relevant laws and institutional guidelines, and have been approved by the Ethical Committee, Faculty of Medicine, Comenius University (number 39/2022, date 27.06.2022). The informed consent was obtained for experimentation with human subjects. The privacy rights of human subjects was respected.

Results

The median value for the lengths of the PCR product was 335 bp (range: 318-346 bp). Based on the RS3 lengths, alleles were classified as short (S) or long (L), resulting in three genotype groups: SS (n = 6), LL (n = 18), and SL (n = 18). The SS allele group exhibited a mean couple satisfaction score of 147.3 (SD = 14.3, range 120-161), whereas the LL allele group scored 135.9 (SD = 23.2, range 81-160) and the SL allele group achieved a score of 128.3 (SD = 23.4, range 75-156). No

significant difference was found in couple satisfaction between the three genotype groups ($p = 0.114$).

Participants with children reported a mean couple satisfaction score of 120.2 (SD = 20.6, range 75-161), while those without children reported a mean score of 136.2 (SD = 22.9, range 91-150). It has been shown that participants with children reported significantly lower levels of partner satisfaction compared to participants without children ($p = 0.032$, Cohen's d = 0.735, $t_{(51)} = 2.304$). The threshold for partner satisfaction according to the CSI (104.5) was met by 75% of participants with children and 88% of participants without children.

Discussion

Socioemotional behaviour, including satisfaction in couple relationships, is a complex phenomenon determined by the interplay of numerous genetic and sociodemographic factors. This study aimed to investigate whether partner satisfaction is associated with either a polymorphism in the AVPR1A gene or the presence of children within the partnership. Our findings indicate that partner satisfaction was not relate with the analysed genetic variability. However, participants with children reported lower levels of partner satisfaction compared to childless participants.

The AVP system plays a significant role in various socioemotional processes, but its relationship with partner satisfaction remains unclear. AVPR1A, a key component of the AVP system, exhibits variable expression under physiological conditions, influenced by, among other factors, promoter gene polymorphisms (Hammock *et al.* 2005; Hammock & Young 2005). Experimental reduction of AVPR1A expression in the prairie vole ventral pallidum resulted in a significant impairment in the preference for a mated female partner (Barrett *et al.* 2013). In humans, one of the most common alleles for RS3, the 334 allele, was associated with a significantly lower pair-bonding score compared to carriers of other alleles, with a relatively small effect size (Walum *et al.* 2008). However, Zietsch *et al.* (2015) found no association of RS3 with extra-pair mating (Zietsch *et al.* 2015). Additional studies have investigated variables related to partner satisfaction, such as sexual satisfaction and social interaction abilities (empathy, etc.) (Uzefovsky *et al.* 2015). These studies have shown that variability in the AVPR1A gene is related to empathy and other traits that are building for a healthy and peaceful relationship. Our study thus seems to be in contrast with the results of the mentioned studies. The likely explanation is that the gene contributes only a small effect to partner satisfaction, and a larger sample size is needed to reveal this.

Partner satisfaction is a complex construct influenced by a multitude of psychological and sociodemographic factors. Our findings align with previous research demonstrating a significant association between partner satisfaction and the presence of children (Kowal *et al.* 2021; Twenge *et al.* 2003). This relationship, however, may not be universally applicable and could exhibit cultural variations. For instance, a study conducted among the Igbo ethnic group in Nigeria revealed a positive association between a higher number of children and increased marital satisfaction (Onyishi *et al.* 2012). In addition to cultural factors, religiosity and the level of education play a role in shaping this relationship (Kowal *et al.* 2021). There can be various potential explanations for the association between partner satisfaction and the presence of children. Child care, particularly during early childhood, is often associated with impaired sleep quality. Sleep deprivation, in turn, has been shown to predict increased fatigue, irritability, and a perceived decline in relationship quality (Audigier *et al.* 2023). Raising children demands a significant amount of parental attention, potentially reducing the time available for partners to dedicate to each other, a crucial factor for cultivating a satisfying relationship (Hogan *et al.* 2021). Marital satisfaction is also linked to financial satisfaction (Archuleta *et al.* 2011). The presence of children places additional demands on financial resources, which may coincide with increased workload, stress, and further reductions in time dedicated to the partner.

This study, conducted on limited sample of participants, did not suggest the role of genetics accounting for the variance in partner satisfaction. However, our findings indicate that the presence of child is related to partnership quality and attachment. This observation may feed not only to behavioural research but also to awareness programs, education and support for parents. Increased awareness of challenges associated with parenthood leads to better accessibility of help and resources, to more effective care of their own wellbeing, to shaping better social policies. Open discussions about the struggles of parents can help reduce stigma and encourage seeking support, as mental health and overall well-being are increasingly recognized as high priorities.

Conflict of interest

Authors declare there is no conflict of interest.

Funding

None.

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