INTERPRETING SEXUAL INTERACTIONS

A Multi-Method Study of Sexual Behavior and Sexual Communication in the Early Stages of Romantic Relationships

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INTERPRETING SEXUAL INTERACTIONS:

A MULTI-METHOD STUDY OF SEXUAL BEHAVIOR AND SEXUAL COMMUNICATION IN THE EARLY STAGES OF ROMANTIC RELATIONSHIPS

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ABBREVIATIONS

ACQ	Areas of Change Questionnaire
APIM	Actor-Partner Interdependence Model
CSI-32	Couple Satisfaction Index
DSC	Dyadic Sexual Communication
DSHQ	Demographics and Sexual History Questionnaire
DSM-5	Diagnostic and Statistical Manual of Mental Disorders 5
ECR-R	Experience in Close Relationships Scale – Revised
EFT	Emotionally Focused Therapy
ELISA	Enzyme-Linked Immunosorbent Assay
FA	Factor Analysis
HRV	Heart Rate Variability
ICC	Intra-Class Correlation
OT	Oxytocin
QSI	Quality of Sex Inventory
SCIFF	System for Coding Interactions and Family Functioning
SPAFF	Specific Affect Coding System
VSAM	Vulnerability-Stress-Adaptation Model

SCIENTIFIC SUMMARY

Background

Sexuality is an integral part of most intimate relationships and is associated with both positive and negative relational and health outcomes. Whereas such associations are well established, the question of *how and for whom* sexual aspects of the relationship positively or negatively impact relationship quality remains largely unanswered. Although historically, the topics of sexuality and intimate relationships have had their own, mostly separate research traditions, currently, a burgeoning body of research is attempting to unite the two fields. The current research project aims to contribute to this evolution by filling critical gaps in our understanding of the associations among sexual and nonsexual relationship processes and couples' relationship satisfaction. Most previous research has focused on self-report and individual-based assessments and variables. The current project examines dyad-based processes on the level of the individual as well as the couple and investigates the contributions of sexual behavior and sexual communication to relational well-being through a dyadic lens and by using both self-report and observational methods. The following four specific aims were pursued in this doctoral thesis: *(1)* Examine the importance of sexual frequency and sexual communication in young, mixed-sex couples in the early stages of their relationship; *(2)* Examine the associations between different sexual behaviors and relationship satisfaction and test the impact of individual variables (i.e., attachment) on these associations; *(3)* Examine the characteristics of observed couple communication behaviors during sexual and nonsexual discussions and their associations with relationship satisfaction; *(4)* Explore neurophysiological dimensions of sexual communication by examining the association between oxytocin and observed communication behaviors during sexual and nonsexual couple discussions.

Methods

Using a multimethod approach that includes questionnaires, observations, and hormone assays, we recruited and collected data in 126 young, mixed-sex couples in the early stages of their relationship ($N = 252$). Two laboratory visits were scheduled, the first to explain the study and to obtain blood samples, and the second to have couples complete questionnaires and participate in videotaped couple discussions, 7 minutes each, on a sexual and nonsexual topic. Communication behaviors were coded using an adaptation of the Specific Affect Coding System (SPAFF) and the System for Coding Interactions and Family Functioning (SCIFF). Oxytocin plasma levels were determined using enzyme-linked immunosorbent assays (ELISA). Analyses were guided by the actor-partner interdependence model (APIM).

Results

Though self-reported sexual frequency and sexual communication were associated with sexual satisfaction, sexual communication but not sexual frequency predicted relationship satisfaction (*Aim 1*). However, attachment dimensions moderated the association between sexual behavior and relationship satisfaction: In more anxiously attached individuals, sexual frequency *did* predict relationship satisfaction. Unexpectedly, when distinguishing between sexual and intimate behavior, a higher frequency of intimate behavior was also associated with greater relationship satisfaction, but only in avoidantly attached individuals. These findings call for a more differentiated approach to the study of sexuality in couples and are in line with prior findings showing that the impact of intimate and sexual behaviors on relationship satisfaction varies depending on attachment dimensions (*Aim 2*). To explore the qualities of dyadic communication, observed couple communication behaviors during sexual and nonsexual discussions were coded, and results indicated that sexual discussions were characterized by fewer negative and more positive (i.e., affectionate and validating) communication behaviors as compared to nonsexual discussions. We found gender differences in the association between observed negative behaviors during sexual discussions and relationship satisfaction, with only men's behaviors linking to their own and their partner's relationship dissatisfaction. Affectionate and validating behaviors predicted higher relationship satisfaction in one's partner, independent of gender or discussion topic (*Aim 3*). Finally, we found evidence for neurophysiological involvement in the sexual communication patterns of couples. Peripheral levels of plasma oxytocin were significantly associated with specifically observed validating behaviors during the sexual and not the nonsexual couple discussion (*Aim 4*).

Conclusion

We aimed to contribute to our understanding of the relevance of dyadic sexual behavior and sexual communication to relational well-being in the early stages of romantic relationships. In addition to individual-based factors (e.g., attachment) influencing the importance of different sexual behaviors to relational outcomes, our results highlight unique qualities of self-reported and observed sexual communication, as an important contributor to relationship satisfaction, with specific affective qualities and neurophysiological underpinnings. Our findings provide additional insight in the role of sexuality in the early stages of romantic relationships and provide a basis for further research on the importance of sexual behavior and sexual communication.

AUTHOR STATEMENT

This doctoral thesis includes a compilation of four peer-reviewed articles, which have all been published or accepted for publication. As the four articles involve four different journals, the formatting style varies slightly across chapters. Since the doctoral thesis is based on a single, multimethod dataset, the chapters contain some unavoidable repetition. To provide a more general overview of the methods used, we have added a chapter (Chapter Three), that describes the main characteristics of the dataset and the general methods and procedures used. Reference lists for each individual manuscript have been combined and are presented at the end of the doctoral thesis, following the discussion chapter. Throughout the thesis, the word 'we' is used to reflect the collaborative work of all co-authors. Scientific acknowledgments are presented as a separate section, following the references.

PREFACE

I always wanted to be a film director. As a kid, I spent many summers glued to the television screen, and I knew the local video store like the back of my hand. I wrote short reviews of each movie I watched, for personal purposes or in an attempt to win movie tickets or DVD boxes in a magazine contest. There are many wonderful memories to cherish from this moment in my life, but one movie made an everlasting impression: 'When Harry met Sally', a romantic comedy film directed by Rob Reiner, starring Meg Ryan and Billy Crystal. Sexuality can be particularly intriguing to a young teenager, and I still remember the impact Harry and Sally's discussion had on me, when they were having lunch at a crowded New York deli. The scene lasted only three minutes, but undeniably showcased a riveting example of dyadic sexual communication. Beyond my personal impressions, to date, this iconic movie moment still resonates in broader questions about sexuality in romantic relationships: how do individuals discuss sexuality and how do they communicate the hardships they may face in their sexual relationship?

I did not become a film director. My career took a different direction, and I started medical training at the age of 18, set on an adventure for somatic knowledge and destined to develop insights into how the human mind and body function. Thanks to psychiatry, I found ways to satisfy my adolescent dreams, as it allowed me to listen to people's life-stories and witness interactions, ordinary to extraordinary, oftentimes meaningful, and never without significance. Psychiatry training provided many opportunities to not only be a spectator in people's 'biographical films' but also practice creativity in co-directing their life-stories. This was before I had an inkling of becoming a sex researcher.

Medical training has its limitations. Although laced with valuable science and state-of-the-art therapeutic interventions celebrating evidence-based-methods, the topic of human sexuality, beyond the biological, received limited attention. Hence, I subspecialized in the study of human sexuality by completing a master's degree, which incorporates a biopsychosocial approach to thinking about human sexuality, in all its variations and forms of expression. Although this master's training was critical to the further development of my therapeutic skillset and facilitated my navigation through a wide range of sexual topics, it wasn't until my very first face-to-face contact with a patient that my scientific curiosity piqued. Here I was, educated and 'prepared', yet feeling shy and bashful when trying to discuss sexual aspects of the patient's life. This made me think. If this is how I feel, how must the person in front of me feel, on an everyday basis, discussing sexual topics? How can sexuality, as present as it is in social media and popular science, become such a loaded topic in a one-on-one conversation? Much like when Harry met Sally, I was slightly intimated, yet highly fascinated.

This is when I decided to reroute my journey and dive into sex research, to find out more about the topic of sexual communication. It is everyday social interaction that shapes our sense of self, community, and even our quality of life. In our modern life, the ubiquity of sexuality is juxtaposed by the taboo often associated with discussing sexual topics in different contexts. Above and beyond the therapeutic context, there still remains a paucity of words on the sexual communication in everyday partner interactions. In order to better understand and possibly facilitate this communication, I decided to look into what makes it so unique. It was this mystery of sexual communication that motivated me to spend the past years of my life investigating it. This thesis is a result of intensive study and I sincerely hope it will raise awareness on the unique qualities of sexual communication, and how these qualities should not be overlooked in the context of romantic relationships, nor in a therapeutic context, and how they can traverse various aspects of individual and relational wellbeing. There is much more to tell beyond the chapters of this doctoral thesis, so maybe after reading them, other researchers might want to "have what we're having," and see the value in incorporating diverse dimensions of the participant's sexual life into their study scope. Dreaming out loud, I hope this work can create small ripples of movement, helping others overcome barriers in discussing sexual topics, in a professional context or beyond, as much as it has helped me.

CHAPTER ONE

GENERAL INTRODUCTION

"It ought to make us feel ashamed when we talk like we know what we're talking about when we talk about love."

Carver, R. (1981). *What we talk about; when we talk about love.*

CHAPTER ONE: GENERAL INTRODUCTION[1]

1.1. Why Study Sexuality in Romantic Relationships?

Romantic relationships are key contributors to individual well-being and are associated with lower mortality rates (Holt-Lunstad et al., 2010; Robles et al., 2014). However, a growing research literature indicates that it is not being in a romantic or intimate relationship *per se,* but rather the quality of that relationship that is associated with physical and mental health (Kiecolt-Glaser et al., 2010; Miller et al., 2013; Robles et al., 2014). Consistently, the quality of a couple's sexual relationship has been described as one of the most important contributors to relationship quality, resulting in greater individual and relational well-being (Byers, 2005; Fallis et al., 2016; Heiman et al., 2011; McNulty et al., 2016; Schmiedeberg et al., 2017).

Generally speaking, intimate relationships can be characterized by the presence of both physical and emotional intimacy (Wong et al., 2014), with sexual interactions differentiating romantic relationships from other intimate relationships (e.g., friends or acquaintances). Most romantic partners seek sexual fulfillment within their relationship and identify as monogamous. Also, the majority of sexual experiences occur within the context of a romantic relationship (Fletcher et al., 2015; Ziegler et al., 2015). However, the topics of sexuality and relationships have evolved relatively independently, involving largely separate research traditions, and, up to recently, attempts to unite both fields have been limited (Dewitte, 2014; Muise et al., 2018). The main goal of this doctoral thesis is to fill critical gaps in our understanding of the associations between sexual relationship processes and couples' relationship quality. In addition, it aims to improve our understanding of underlying mechanisms by investigating to what degree these associations are influenced by individual- and dyad-based variables.

The topic of sexuality in romantic relationships is important for several reasons. The quality of a couple's sexual relationship impacts relational well-being, and relationship satisfaction has been described as "…a powerful psychological construct with far-reaching societal consequences and policy implications" (Joel et al., 2020, p. 19061). To date, reductionist notions of 'good sex' are still omnipresent in society (e.g., "sex once a week is the standard", "sex is spontaneous and fueled by sudden desire", "the longer the duration of sexual intercourse the better") with common misperceptions about "a good sex life" causing

[1] Some topics included in this chapter have been previously discussed and articulated in Roels, R. "Sexuality in couples: A narrative review of relevant psychological and neurobiological processes", Master thesis in fulfillment of the requirements for the degree of Master in Sexology, 2019, KU Leuven (supervisor: Prof. dr. Erick Janssen). Additionally, some ideas and descriptions from the grants supporting this research (FWO, G0C8216N and KU Leuven, C14/16/076, PI: Erick Janssen) have been incorporated in this chapter as well.

individual and couple-related distress (Metz & McCarthy, 2007). With their "Good-Enough Sex" model, Metz and McCarthy (2007) advocate the importance of reasonable expectations when it comes to couple sexuality, in order to promote the quality of couple sexuality and thus their relational well-being.

In couple therapy, sexuality-related problems are among the most prevalent presenting issues (Peplau, 2003), and sexual issues often have complex, multifactorial origins, potentially yielding psychological distress. These psychological repercussions of sexuality-related problems are reflected in the American Psychiatric Association, Diagnostic and Statistical Manual of Mental Disorders 5 (DSM-5) (American Psychiatric Association, 2013), with a requirement across all diagnoses of sexual dysfunctions to cause clinically significant distress. Sexual dysfunctions are defined in the DSM-5 as "clinically significant disturbances in a person's ability to respond sexually or to experience sexual pleasure" (American Psychiatric Association, 2013, p. 423). Furthermore, the DSM-5 now stipulates a wider range of associated features to be considered during assessment and treatment as compared to the previous version (DSM-IV TR) (American Psychiatric Association, 2000; Mitchell et al., 2016), including partner factors, relationship factors, and individual vulnerability (American Psychiatric Association, 2013). Hence, an awareness of individual *and* relationship processes has worked its way into the medical classification of sexual problems and psychological distress. Additionally, modern sexual medicine has made great advances in clinical competence of treating sexual dysfunctions, however, due to their multi-causal and multidimensional underpinnings, a "quick fix" is seldom possible. It has been argued that any approach to sexual dysfunctions must recognize that – regardless of the cause(s) – "sex is a relationship problem affecting the emotional life of the couple" (Metz & McCarthy, 2007, p. 352). This highlights the value of (re)framing sexuality in a dyadic perspective, as both clinical practice and scientific study could share a common goal: to promote the individual and couple's well-being by shifting the focus from the individual to the dyad.

Despite widespread beliefs that sexual and nonsexual relationship dynamics are intertwined, the mechanisms underlying such associations are still not well understood (Schoenfeld et al., 2017). By applying a dyadic perspective to the study of sexuality, we hope to address limitations of prior sex research, which often focuses on individuals, as well as prior relationship research, which often excludes sexual dimensions (Dewitte, 2014). This way, we aim to promote the knowledge of the characteristics of fulfilling romantic and sexual relationships by considering the perspective of both partners in the relationship. In doing so, we hope to contribute to fruitful directions of future research at the intersection of sexuality and relationships, and to empirically substantiate or challenge common beliefs about "a good sex life".

This thesis focuses on dyads in romantic relationships. The dyad is a central and fundamental unit of interpersonal relationships, and dyadic measurement and analysis incorporate and acknowledge the contribution of two individuals. An assumption of dyadic data analysis is that the two individuals are not independent but, instead, have shared experiences and influence each other (Kenny et al., 2006). In dyadic relationships, partners may influence each other's thoughts, feelings, and behaviors, and this notion of mutual influence is a key aspect of romantic relationships. In heterosexual relationships, dyad members are both nonindependent and distinguishable as they involve a female and male partner. Dyadic analyses allow for the exploration and testing of whether distinguishing factor, such as gender, influence the variables under study. More specifically, the Actor-Partner Interdependence Model (APIM) (Kenny et al., 2006) allows for the simultaneous examination of both partners' contributions by providing two effects estimates: an actor effect, which estimates the effect of partner A's predictor variable on partner A's dependent variable, and a partner effect, which examines the association between partner B's predictor variable and partner A's dependent variable.

Applying this dyadic approach to sexuality has allowed researchers to answer a number of questions, including what the influence may be of one's partner's personality traits on one's own sexual satisfaction (e.g., Butzer & Campbell, 2008), or how the perception of sexual desire can be associated with different relationship outcomes in female and male partners (Muise, Stanton, et al., 2016). Clearly, these types of dyadic associations can only be explored when both partners participate and provide responses. However, this approach, even though possibly more challenging in terms of design and recruitment, lends itself for more intricate and in-depth insights in couple dynamics. For example, Barton and colleagues (2020) note that specifically appraisals of overall relationship stability and satisfaction may be different in dyadic versus single-person data collection, highlighting that study design and data collection and analysis should be guided by research goals and questions. In the next sections, we will discuss the relevance of studying sexuality in romantic relationships through a dyadic lens, and we will focus on couple-level as well as individual-based processes.

1.2. Sexuality in Romantic Relationships

1.2.1. Sexual Satisfaction in Romantic Relationships

Sexual satisfaction in the context of romantic relationships is considered an important component of sexual health and is consistently found to be associated with positive relational and physical and mental health outcomes (Patrick et al., 2013; Rosen & Bachmann, 2008; Schmiedeberg et al., 2017). Similarly, low sexual satisfaction and sexuality-related problems (e.g., desire discrepancies, infidelity) are among the strongest predictors of break-ups and

divorce (Karney & Bradbury, 1995). Indeed, studies have consistently shown that sexual satisfaction is closely linked to overall relationship satisfaction (McNulty et al., 2016; Schoenfeld et al., 2017; Velten & Margraf, 2017) and sexual satisfaction has been described as "the barometer for the quality of a relationship" (Sprecher & Cate, 2004, p. 241). In long-term relationships, a negative association has been found between sexual satisfaction and relationship conflict (Haning et al., 2007), indicating once more that sexual satisfaction is a vital component to stable relationships (Sprecher & Cate, 2004) and holds the power to make "lifelong, valuable contributions to the well-being of individuals within a relationship and to the relationship itself" (Holt et al., 2021, p. 1). Yet, while there is little disagreement on the importance of sexual satisfaction, the concept remains poorly defined, with operationalizations being inconsistent or lacking in scope or precision (Lawrance & Byers, 1995; Pascoal et al., 2014; Rosen & Bachmann, 2008).

Sexual satisfaction transcends the mere presence of sexual orgasm or sexual function, to which it sometimes tends to be reduced, as neither are prerequisites to being sexually satisfied (Holt et al., 2021). Pascoal and colleagues (2014) employed a qualitative approach to help improve our understanding of the construct of sexual satisfaction and found personal sexual well-being and dyadic processes to be two core themes. They concluded that "for heterosexual couples in an exclusive, dyadic, cohabitating relationship the concept of sexual satisfaction could be defined as the emotional experience of frequent mutual sexual pleasure" (p. 27). Consistent with the interpersonal exchange model of sexual satisfaction (Byers & Demmons, 1999), this work points at the relevance of partner exchanges or 'mutuality' to sexual satisfaction and promotes the specific value of positive aspects of the sexual relationship rather than the mere absence of problems or dysfunction.

In the absence of a clear conceptualization of sexual satisfaction, discussion remains, however, whether it should be regarded as a core aspect of relationship satisfaction, or as an independent construct relevant to relational wellbeing. Although positive correlations between sexual and relationship satisfaction have been reported, studies have also found a disconnection, or potential independence, between the two – with some individuals reporting high relationship satisfaction and low sexual satisfaction, or vice versa (Apt et al., 1996). This is consistent with notions from evolutionary psychology and attachment theory, that describe relationship formation and sexuality as two distinct, yet interdependent, systems (Birnbaum et al., 2006; Diamond, 2003). When it comes to their association, other factors come into play, with studies yielding various results depending on individual attachment orientations (Birnbaum et al., 2006; Butzer & Campbell, 2008) and couple communication skills (Litzinger & Gordon, 2005), among others. In an attempt to paraphrase their complex interaction, sexual and relationship satisfaction have been described as both theoretically and empirically distinct constructs, that are linked to (other) sexual and relationship processes in different ways (Fallis

et al., 2016). In light of the above, we have opted to focus on relationship satisfaction as our main outcome variable. This way, we hope to paint a more comprehensive picture of how different aspects of the sexual relationship affect the participants' evaluations of their overall relational well-being, surpassing the mere adherence to their self-reported levels of sexual satisfaction as an indicator of the quality of their sexual relationship.

In this thesis, we focused on two specific dimensions of a couple's sexual relationship: sexual behavior and sexual communication.[2] Needless to say, sexuality is a complex construct that includes a myriad of biological, psychological, and social components. The value we assign to any of those components, is likely to be reflective of our personal perspective or point-of-view. One could say that, in the scientific study of certain sexual characteristics, sex *is* in the eye of the beholder, as the prioritization of specific characteristics has an inherent subjective dimension. Moreover, research generally involves a reduction of reality, which to an extreme degree threatens to become meaningless (the word "reductionist" itself stems from the Latin *reducere*, "bring back", referring to its intention to bring back or reduce complex matters into simpler constituents). In an attempt to limit reductionist simplifications on the one hand, and convoluted overinterpretations on the other, our choice for focusing on sexual behavior and sexual communication represents a desire to focus on a more quantitative or behavioral and a more qualitative or affective dimension of couple's sexuality. This subdivision is in line with the work by Pascoal and colleagues (2014), which not only highlights a two-dimensional nature of the construct of sexual satisfaction (personal and dyadic), but also points at a behavioral dimension of sexual variables (frequency and functioning) and an affective dimension of relationship variables (expressions of feelings and intimacy), as main contributors. Although these dimensions have been explored separately in prior work, questions prevail concerning their interaction or relative contribution to the sexual domain of romantic relationships. In other words, how and to what degree do the behavioral and affective dimensions of sexuality impact couples' relationship satisfaction.

Furthermore, earlier work by Byers and Demmons (1999) also pointed at the relevance of improving our understanding of how physical characteristics of couples' sexual interactions (the behaviors couples engage in, as well as their frequency) and affective, interpersonal relationship aspects interact and co-determine the sexual relationship of romantic partners. Considering that some of the most common problems in sex therapy involve couples not having sex as frequently as one or both partners would like and couples experiencing

[2] In line with prior definitions (Metts & Cupach, 1989; Simon & Gagnon, 1986), we define sexual communication as the process of self-disclosure by which partners share preferences and may seek change, and respond to requests for change, in their sexual relationship. The quality of this communication consists of a combination of satisfaction with communication about sex and the perception of being able to discuss sexual matters with a partner (Mallory et al., 2019). We refer to this process, consistent with the empirical literature in this area, as "sexual communication," but we acknowledge that although the subject matter is sexual, the communication itself is not.

difficulties communicating about sex, therapy could benefit from addressing both of these dimensions of sexuality (Chesney et al., 1981; Peplau, 2003). For most sex therapists dealing with distressed couples, therapy goals tend to involve some combination of improving sexual communication and (affective) exchanges, as well as improving and increasing sexual intimacy at the behavioral level (e.g., through exercises, home-work, sensate focus) (Greenberg, 2004; Masters & Johnson, 1970). Yet, we still know relatively little about the relative importance of these two dimensions or processes to therapy outcomes (McCarthy et al., 2004). Hence, we believe a more systematic study of the affective (e.g., the way in which couples interact and communicate about sex) and behavioral (e.g., the frequency of their intimate and sexual interactions) characteristics of a couple's sexual relationship, and their relevance to relationship satisfaction, may not only improve our scientific understanding of these processes, but it may, ultimately, contribute to couple and sex therapy.

According to Metz and McCarthy (2007) "the primary aim of sexual therapies should be couple satisfaction" (p. 353). Romantic relationships have the potential to provide lifelong sexual fulfillment, however couples may face an erosion of these positive qualities over time, leading to relational distress, conflict, or break-up. Given the well-substantiated implications of relationship satisfaction for health and well-being, understanding what makes relationships thrive has become a central mission of relationship science. Above and beyond scientific research, relationship satisfaction can not only be an indicator of overall relational functioning and wellbeing, it can, according to some, be considered a gold standard to evaluate therapy interventions designed to reduce relationship distress (Fincham et al., 2018). In the therapeutic quest to alleviate the many problems partners may experience during their relationship, whether or not in the context of the sexual relationship (e.g., sexual dysfunctions), psychological, relational and psychosexual skills aim to improve relational well-being.

1.2.2. Theoretical Perspectives

Several theoretical perspectives exist that can be used to examine the role of sexuality in committed relationships. One way of interpreting the interplay between couple's sexuality and couple's relational well-being, grounds itself in models of person perception, and suggests that people base their idea of the relationship on specific characteristics of that relationship (McNulty et al., 2016). This is also referred to as *bottom-up processing* (Rothbart, 1981). Sexuality can be such a characteristic, and satisfactory sexual experiences within the relationship can lead to a positive evaluation of that relationship. Similarly, interdependence theory and social exchange models (e.g., Kelley & Thibaut, 1978) state that people balance the perceived rewards and costs associated with their relationship, to estimate its success. This perspective has successfully predicted overall relationship satisfaction, and has led to the

development of the interpersonal exchange model of sexual satisfaction (Byers & Demmons, 1999). According to the interpersonal exchange model, the relationship will be evaluated as more satisfactory when rewards exceed costs. On the other hand, according to notions about *top-down processing* (Olson & Fazio, 2003), people base their idea of specific aspects of a target on the overall evaluation of that target, which has also been applied in the context of relationships. Weiss (1980) argued that being generally satisfied in one's relationship can override perceptions of specific qualities of that relationship. Applied to sexuality, this implies that more relationally satisfied couples will evaluate the sexual aspects of their relationship more positively.

As mentioned earlier, researchers tend to reduce reality's complexity by favoring a specific perspective and downplaying or disregarding other viewpoints. For instance, in the study of romantic relationships, some theories have emphasized one type of processing while, it could be argued, neglecting the other. According to McNulty and colleagues (2016) this is reflected in research based on attachment theory (Shaver & Mikulincer, 2002), which uses top-down processing to comprehend how and why insecurely attached individuals may experience relational disturbances. In other words, according to attachment theory, "people's broader beliefs about their partners and relationships shape their perceptions of those partners and relationships" (McNulty et al., 2016, p. 95). However, this does not offer insights into how bottom-up processes may cause or impact relational challenges. In contrast, behavioral perspectives (e.g., Wills et al., 1974)) use bottom-up processes to interpret how partners' experiences with one another shape their evaluation of their relationship, providing no information about how the evaluation of these behaviors may be influenced by appraisals of the overall relationship. In their study of sexual and relationship satisfaction, McNulty and colleagues (2016) emphasized that these two perspectives are not necessarily mutually exclusive. In the context of relationships, the Vulnerability-Stress-Adaptation Model (VSAM) (Karney & Bradbury, 1995; McNulty et al., 2021) is an example of a theoretical perspective that allows both processes to co-exist, in a bidirectional fashion, while integrating basic themes and premises from several prominent theories of long-term intimate relationships (i.e., social exchange, behavioral, attachment, and crisis theory). This model states that partner's perceptions of their behavioral interactions can predict their relationship evaluation (*bottom-up*) and vice-versa (*top-down*). A basic proposition of this model is that the likelihood that couples will successfully respond to and deal with the stressors, challenges, and transitions (S) they will face during their relationship (including those related to intimacy and sexuality) depends on an interaction between individual-based factors (V) (vulnerabilities and qualities, including personality traits) and couple-level adaptive processes (A) (i.e., the ways they respond to each other and to events and challenges as a couple). By incorporating both bottom-up and top-down processing, a more comprehensive description of relationship

functioning, stability, and change can be addressed. The VSAM states that individual and partner qualities do not affect relationship satisfaction directly, but indirectly through their direct effects on adaptive processes, including the exchanges and interactions that take place between dyad members.

In short, the VSAM demonstrates the importance of a complex interplay between individual and couple-related processes. The likelihood that couples will successfully deal with and respond to stressors, challenges, and transitions during their relationship depends on the interaction of both these individual and couple-related processes. Although several theories have been formed about the relevance of these processes to the couple's relational dimension, the VSAM guides, as a general theoretical framework, the research presented in this doctoral thesis. We will now elaborate on possible couple-level and individual-based processes in the context of the sexual relationship.

1.3. Couple-level Sexual Processes

Based on scientific and clinical evidence highlighting the importance of both the affective and behavioral dimensions of sexuality in a couple context that were discussed above, we focus on an affective and a behavioral dimension of couples' sexual relationship. Though this subdivision can be considered somewhat arbitrary, as a clear delineation of what is affective and what is behavioral is impossible to make, the choice for this approach is based on prior findings, and its merit is discussed in the next paragraphs.

1.3.1. Affective Characteristics of the Sexual Relationship

A major theme that has emerged from relationship, including marital, research is that the affective characteristics of a couple's relationship are important predictors of relationship quality and stability (Gottman, 2014; Graber et al., 2011). Increasingly, such affective characteristics are also found to be relevant to health-related processes and outcomes (Kiecolt-Glaser et al., 2010). The affective characteristics of couple relationships have most commonly been assessed using videotaped problem solving or conflict discussions and operationalized in terms of the degree to which partners exchange positive/negative, approach/withdrawal, or supportive/hindering behaviors during such discussions. Research into these expressions can not only improve our understanding of the complex emotional interplay that is in the forefront of dyadic interaction, it can also provide future guidelines for possible interventions in couple therapy. In the next sections we will focus on couple interactions through couple communication, as an operationalization of this affective dimension, and we will provide an overview of its associations with relational and sexual well-being, as well as discuss the advantage of observational assessment.

1.3.1.1. Communication and the Romantic Relationship.

People like to observe others. Whether you are waiting in line, eating in a restaurant or simply strolling around the park, our gaze tends to wander, and is often attracted to dyadic interactions, which we curiously interpret based on our own observations. This basic human interest undoubtedly lies at the heart of the success of many movies and television shows, where the ups and downs of dating and relationships take central stage, to great delight of many viewers. Couple researchers have been part of this league of adept "observers" from a long time, and have associated a range of psychological processes to the observation of couple relationships (Kerig & Baucom, 2004). Of these researchers, John Gottman can be regarded a pioneer, using a multimethod approach to study couple interactions *in vivo,* and to link observed behaviors to marital stability and divorce (Gottman & Levenson, 1999). On the basis of his research he concluded that couple communication is one of the most important predictors of relationship quality and stability (Gottman, 1994).

In his book "The Seven Principles for Making Marriage Work" (Gottman, 2000), Gottman laid the foundation of which aspects in couple communication can be detrimental to building or maintaining intimacy and developing a healthy or unhealthy communicative climate. In problematic relationships, emotional disengagement is pushed forward as an important symptom: partners show little positive affection, no humor, no fun, no passion, and overall, no interest in interacting with each other. This emphasizes the importance of experienced or expressed emotions during dyadic interactions. According to Gottman and colleagues (2002), couple conflict often originates from problems that will remain present throughout the couple's relationship, such as differences in personality or relationship expectations, which are generally believed to be unsolvable. Crucial to relational development is not trying to change personality or solve these problems *per se*, but rather to focus on the behaviors and affect that are associated with the discussion of such topics, or the problems that may result from them.

Individuals can vary in terms of emotional expressions (Barr et al., 2008) and studies have shown that, in the context of a romantic relationship, partners experience and express their emotions most frequently and intensely (Knobloch & Metts, 2013; Schoebi & Randall, 2015). Consistently, the communication techniques couples use to navigate challenges and disagreements arising in the context of intimate relationships have been found to predict relationship satisfaction and stability (Feeney, 1994; Gottman, 2014; Graber et al., 2011; Mark & Jozkowski, 2013; Montesi et al., 2010; Theiss, 2011). Additionally, a range of theoretical perspectives conceptualize the quality and pattern of communication between romantic partners as a critical mechanism in the development and treatment of relationship problems. For instance, communication between partners is viewed as a causal mechanism in cognitive-behavioral (Baucom et al., 2019; Dugal et al., 2018), interpersonal (Clulow, 2018), and

emotion-focused (Vazhappilly & Reyes, 2018) theories of relationship problems, suggesting that this is a construct of transtheoretical significance (Cordova et al., 2005; Halford et al., 2001). In their review of common mechanisms of change across different approaches to couples therapy, Snyder and Halford (2012) noted that decreasing dysfunctional patterns of interaction is a universal process that is not specific to a particular theoretical approach to couples counseling.

1.3.1.2. Communication and the Sexual Relationship.

In most observational studies on couple communication, there is little experimental control over the selection of discussion topics (Heyman, 2001). That is, in most studies, couples select their own topics (e.g., time spent together, finances). Yet, evidence suggests that certain relationship domains may be particularly important to relational well-being. The quality of a couple's sexual relationship is one such domain (Butzer & Campbell, 2008; Rehman et al., 2011; Sprecher & Cate, 2004). The process by which partners share their sexual preferences and may seek change, and respond to requests for change, in their sexual relationship may be defined as *sexual communication* (Simon & Gagnon, 1986), and its relevance to relational well-being is supported by extensive empirical work. For instance, previous research has found greater levels of sexual self-disclosure, defined as the degree to which individuals share their sexual likes and dislikes with their partner, to be positively associated with sexual satisfaction (MacNeil & Byers, 2005; MacNeil & Byers, 2009). Also, the self-perceived quality of sexual communication in the relationship has been found to be a robust and consistent predictor of both sexual satisfaction (Cupach & Comstock, 1990) and relationship satisfaction (Byers, 2005; Litzinger & Gordon, 2005; Yoo et al., 2014). Conversely, indirect or difficult communication about sexual intimacy has been found to be associated with lower sexual satisfaction (Theiss, 2011).

Further studies built on this and have described the specific characteristics of sexual communication compared to more general communication. In a study by Jones and colleagues (2018), better communication has been found to be associated with higher satisfaction of both the relationship and the sex life, specifically when this communication focused on sexual topics (compared to general topics). Additionally, a significant association of favorable sexual communication with relationship satisfaction in both partners was found, as well as significant associations with increased orgasm frequency in women and increased sexual frequency in men. Although both general and sexual communication play their role in the relationships, a burgeoning body of research is beginning to reveal the specific importance of sexual communication to the satisfaction, both sexual and relational, of both partners (e.g., Byers, 2011; Frederick et al., 2017; Montesi et al., 2010).

1.3.1.3. Assessing the Affective Characteristics.

Rooted in self-report and interview studies of the 1930s (Gottman & Krokoff, 1989), today, the scientific study of couple communication includes many other types of data collection and analysis, including couple observation and the use of APIM. In general, the most appropriate methodology for assessing communication depends on the specific questions examined (Noller & Feeney, 2003). Yet, observational techniques offer unique advantages over other methods, such as self-report methods, as they do not rely on the participants' perceptions of their own and their partner's communication skills or style. Also, individuals may change their behavior across contexts, and communicate about different topics in different ways, without necessarily being aware they are changing their behavior (Fletcher & Kerr, 2010). To date, however, the observational study of human sexuality in the context of romantic relationships remains underrepresented in the empirical literature, and the study of sexual communication relies predominantly on the use of questionnaire and other self-report data.

In most observational studies, couples are allowed to select their own discussion topics. Although sexuality can be such a topic, partners are allowed to veto a topic, and generally speaking, researchers do not report which topics were or were not selected. To date, only two studies have examined differences between sexual and nonsexual couple communication using observational methods (Rehman et al., 2011; Rehman et al., 2017). Rehman and colleagues (2011) found that negative behaviors during sexual discussions were more strongly associated with relationship distress than those expressed during nonsexual discussions. Although the study size was limited, based on a sample of only 15 couples, the findings suggested that communication patterns during sexual (as compared to nonsexual) couple discussions, and especially negative expressions and behaviors during such discussions, may be particularly sensitive markers of relationship (dis)satisfaction.

More recently, Rehman and colleagues (2017) compared communication patterns during sexual and nonsexual discussions in a sample of 115 couples and found that they reported higher levels of anxiety before sexual (as compared to nonsexual) conflict discussions. In addition, partners displayed greater warmth during the sexual discussions. These findings point at important differences in how sexual versus nonsexual conflict discussions are experienced and navigated by romantic partners. Research therefore benefits from making a distinction between sexual and nonsexual communication when studying couple relationships. In doing so, it can offer both theoretical and clinical added value to consider the possible obstacles that couples experience when discussing sexual or nonsexual aspects of their relationship.

1.3.2. Behavioral Characteristics of the Sexual Relationship

Back in 1968 - uncoincidentally the heyday of the sexual revolution - the American novelist and poet John Updike stated that “Sex is like money; only too much is enough” (Updike, 1968, Ch. 5). In a similar vein, popular messages in the media continuously emphasize the importance of sexual behavior and imply that engaging in more frequent sex is better, be it for oneself or one’s relationship (Muise, Schimmack, et al., 2016). Considered one of the most important contributors to sexual satisfaction (Pascoal et al., 2014), a direct association between sexual frequency and sexual satisfaction in romantic relationships has been well substantiated in research too (Schoenfeld et al., 2017; Velten & Margraf, 2017). Moreover, positive associations among sexual frequency, sexual satisfaction, and life satisfaction have been described (Schmiedeberg et al., 2017). Sexual frequency has also been associated with relationship satisfaction (Impett et al., 2014), yet this link tends to be less direct (Meltzer & McNulty, 2010). Sexual frequency can become a focal point in many relationships, as is consistent with observations from sex therapy, with sexual desire discrepancy (i.e., the difference between an individual’s desired and actual sexual frequency within a given relationship) being a presenting and prevalent problem (Willoughby & Vitas, 2012). Correspondingly, research has revealed that a large number of both women and men in mixed-sex relationships indicate not being satisfied with their sexual frequency (Smith, Lyons, et al., 2011). Both women and men who were dissatisfied with their sexual frequency showed lower sexual and relationship satisfaction, highlighting (desired) sexual frequency as a major factor in relational well-being.

The question arises if, as John Updike suggests, more is indeed better? Elliott and Umberson (2008) used the term *emotional work* (or ‘performing desire’), as a way for couples to cultivate “satisfactory levels” of sexual frequency, by tuning their desire to the needs of their partner. However, what are “satisfactory levels" and how strongly does sexual frequency relate to overall relational well-being? Throughout their relationship, romantic partners may face disagreements over sexual frequency, preferred behaviors, or the need or desire for sexual variety, and research findings as well as clinical observations support the idea that satisfied couples have “regular” sex (e.g., 1-2 times per week) (Laumann et al., 1994). According to the “Good-Enough Sex” model, couples can benefit from sexual intimacy as a means to maintain a satisfying relationship, but they can also benefit from adjusting their expectations of “a good sex-life” (Metz & McCarthy, 2007). Not sexual frequency itself, but rather the appreciation of the variation in the quality of sexual contacts may facilitate realistic expectations for a satisfying relationship. However, surprisingly little research has challenged the idea of what actually constitutes an “ideal” sexual frequency. In a demographically diverse sample, Muise, Schimmack, and Impett (2016) found that the association between sexual frequency and individual well-being is only significant for people in relationships, and that, in these couples,

sexual frequency is no longer significantly associated with relationship satisfaction at a frequency higher than once a week. In another study, couples did not report greater well-being when instructed to increase their sexual frequency, compared to a control group of couples maintaining their sexual frequency (Loewenstein et al., 2015). In fact, the opposite was found, prompting a critical re-evaluation of John Updike's presumption that "enough" doesn't really exist.

Research has consistently shown that in most romantic relationships, sexual frequency declines over time (Call et al., 1995; Rao & Demaris, 1995; Twenge et al., 2017). McNulty and colleagues (2016) were among the first to investigate the longitudinal associations between relationship satisfaction, sexual satisfaction, and sexual frequency at the couple level. In their sample of newlywed couples this decline in sexual frequency was accompanied by a decrease in sexual and marital satisfaction, and this decrease was larger in the beginning and gradually became smaller (McNulty et al., 2016). By studying couples, McNulty and colleagues (2016) also examined the role of the partner, finding that the partner's initial levels of relationship satisfaction were negatively associated with changes in sexual frequency and the partner's own sexual satisfaction. The authors provided as possible explanation that, in cases of low relationship satisfaction, greater importance may be attached to sex, in the hope of saving the relationship or making the best of the relationship, resulting in higher sexual frequency and sexual satisfaction. However, this remains speculation.

Recent studies report somewhat contradictory results when it comes to the association between sexual frequency and sexual satisfaction, with some studies finding no gender differences between a positive association (Schoenfeld et al., 2017) and other studies showing that sexual frequency plays a role in sexual satisfaction in women, but not in men (Velten & Margraf, 2017). Velten and Margraf (2017) show that, when exploring the role of sexual behavior in romantic relationships, other dimensions should be taken into account, and research should focus on possible mediators and moderators, at both the individual and couple-level. To debunk societal notions on "ideal" sexual frequencies more needs to be discovered about the degree to which sexual frequency really matters for relational well-being and relationship stability, and how individual characteristics may influence such associations.

1.4. Individual-based Processes

Each partner brings their own personal traits and characteristics into the relationship. Research has long focused on personality traits and their influence on romantic relationships. Contemporary trait studies focus on the stability of our personality and although they have gained popularity in personality research, little systematic research has been done on sexuality from the perspective of personality theory (Fajkowska & Kreitler, 2018). More recently, researchers have begun to study the impact of attachment orientations on adult sexual and

romantic relationships (Dewitte, 2012; Mikulincer & Shaver, 2007; Peloquin et al., 2014). In the next section we will briefly discuss the psychological and neurophysiological underpinnings of romantic attachment, with specific attention to its relevance to couple sexuality. We acknowledge that our decision to treat these topic as individual-based is not without its limitations, as they are likely to also involve and, at least to a degree, be impacted by interpersonal and contextual processes.

1.4.1. Attachment

1.4.1.1. Attachment and Relationships.

Attachment orientations are established in childhood and guide a wide range of behaviors, emotions, cognitions, and motives (Ainsworth et al., 1978; Bowlby, 1982). During childhood, parents are often the most important caregivers and thus the most important attachment figures. In adulthood, the role of attachment figure tends to be passed on to romantic partners (Hazan & Shaver, 1987). Thus, romantic relationships become a principal playing field in which personal characteristics and interpersonal dynamics manifest themselves with the potential to impact the quality and stability of relationships (Birnbaum & Reis, 2018; Hazen & Shaver, 1987).

Early experiences play a role in adult relationships because they are believed to shape mental representations of both one's self and others which in turn influence our expectations about social interactions and processes, including love and relationships (Gillath & Shaver, 2007). If early experiences with primary caregivers are positive, this contributes to positive cognitions about oneself (e.g., of being "worthwhile") and to a more "secure" attachment orientation (Ainsworth et al., 1978). Inconsistent, rejection-related, or other negative experiences, in contrast, may contribute to negative cognitions about oneself and others and result in the development of a more "insecure" attachment orientation (Ainsworth et al., 1978).

Most studies of adult attachment focus on two dimensions, attachment anxiety and attachment avoidance (Fraley et al., 2000; Griffin & Bartholomew, 1994; Mikulincer & Shaver, 2007a). Attachment anxiety is characterized by fear of rejection and abandonment by relationship partners, whereas attachment avoidance, in contrast, involves emotional distancing and extreme independence and is associated with feeling uncomfortable being close to others.

1.4.1.2. Attachment and Sexuality.

In many if not most cases, romantic partners are both attachment figures and sexual partners (Hazan & Zeifman, 1994), and research has shown that attachment dimensions can

influence sexual motives, attitudes, and feelings, as well as sexual function, frequency, and satisfaction (Birnbaum & Reis, 2018; Gewirtz-Meydan & Finzi-Dottan, 2018; Mark et al., 2018; Peloquin et al., 2014). Not only can physical closeness during sexual interactions contribute to the quality of romantic relationships and the formation of attachment bonds, sexuality can also be used as a means to meet attachment needs, such as creating a sense of security and involvement, or to reduce anxiety and negative thinking (Birnbaum, 2010; Hazan & Zeifman, 1994; Johnson & Zuccarini, 2010).

Different attachment dimensions affect sexuality in different ways (Davis et al., 2004; Dewitte, 2012). Securely attached individuals are more likely to use sex as a way to express love for their partner (Tracy et al., 2003), and they tend to feel more comfortable with sexual intimacy and experience more enjoyment from sexual interactions – without compromising their own needs (Birnbaum et al., 2006) – as compared to more insecurely attached individuals (Birnbaum, 2015; Hazan & Zeifman, 1994; Mikulincer & Shaver, 2003; Tracy et al., 2003). This translates into a greater openness to sexual exploration and more frequent sexual interactions with one's partner than may be found in less securely attached individuals (Hazan & Zeifman, 1994; Tracy et al., 2003). In contrast, less positive associations have been found for insecurely attached individuals, with both anxious and avoidant attachment dimensions being associated with lower levels of sexual satisfaction and an increased likelihood of experiencing sexual problems (Butzer & Campbell, 2008; Khoury & Findlay, 2014; Peloquin et al., 2014). Yet, anxious and avoidant attachment dimensions are also associated with their own, specific sexual outcomes (Davis et al., 2006).

Beyond an individual's own attachment orientation, research has started to explore connections between sexuality and relationships when the attachment dimensions of *both* partners are taken into account. For example, Brassard and colleagues (2012) found that anxious attachment in men predicted their female partner's sexual dissatisfaction, and avoidance in women was associated with their male partner's sexual dissatisfaction. Also, Butzer and Campbell (2008) found that attachment avoidance of the partner was a negative predictor of one's own sexual satisfaction, whereas attachment anxiety of the partner was associated with a stronger connection between one's own sexual and marital satisfaction. A more recent study by Conradi and colleagues (2017) found sexual satisfaction in both men and women to be negatively impacted by their partner's attachment avoidance. Also, relationship satisfaction in women was negatively impacted by their male partner's scores on attachment avoidance.

Of course, the above does not mean that every relationship is doomed for people who score higher on the continuum of anxious/avoidant attachment. Several protective factors can come into play. For example, research showed that sexual satisfaction can be a protective factor for relationship satisfaction in anxiously attached individuals and sexual frequency can

have the same effect in avoidantly attached individuals (Little, McNulty, & Russell, 2010). When it comes to the scientific study of attachment and sexuality, Gewirtz-Meydan and Finzi-Dottan (2018) found that the majority of past research focuses on individuals rather than couples in committed relationship. Their findings emphasize the importance of implementing a dyadic perspective on the study of attachment and sexuality, which is in line with current recommendations from sex and relationship researchers alike (Muise et al., 2018). To date, however, research that incorporates both partners' attachment dimensions remains limited, and there is a surprising lack of research on the interplay between sexuality and relational well-being in the early stages of romantic attachment.

1.4.2. Oxytocin

Whereas the literature on the association between relationship satisfaction and physical and mental health is expanding (Fincham et al., 2018), the physiological and neuroendocrine mechanisms underlying such associations are still not well understood (Schneiderman et al., 2014). Described as a neurological correlate of attachment (Carter, 2017b), the molecule oxytocin (OT) has increasingly gained attention, with studies describing its role in human evolution, modern medicine and health, and in the promotion of prosocial and affiliative behaviors (Carter et al., 2020). OT is a neuropeptide that acts both as a hormone and a neuromodulator, occupying multiple positions in the relational, reproductive, and sexual field, in both women and men (Veening et al., 2015). Most research on OT involves the measurement of endogenous levels in individuals (Ebner et al., 2019; Lancaster et al., 2015; Plasencia et al., 2019) or the administration of exogenous OT and assessment of its effects on couple communication and dynamics (Ditzen et al., 2009; Flanagan et al., 2018; Jarnecke et al., 2018; Rilling et al., 2014). In comparison, research on the role of endogenous OT (measured peripherally in saliva or blood) in couple processes remains limited. Below, we provide a brief overview of some key findings of research on OT in the context of relationships and sexuality.

1.4.2.1. Oxytocin and Relationships.

Studies have pointed at OT's role in relationship formation (Carter, 1998), prosocial and affiliative behavior (Carter, 2014), orgasm (Carter, 1992) and trust, support, and threat reduction (Crockford et al., 2014). Neural correlates of the capacity for the formation of romantic attachment have been associated with OT receptors (Carter et al., 2020) and bidirectional influences have been found between physiological, including hormonal, and behavioral processes in romantic partners (Schneiderman et al., 2014). Additionally, evidence is emerging for the importance of OT pathways in the adaptive consequences and benefits of

human attachment formation (Carter, 2017b). OT levels are higher in partnered individuals during the early stages of romantic attachment, suggesting an important role of OT during these first stages of couple formation (Schneiderman et al., 2012). Although factors modulating the association between relationship quality and plasma OT remain unclear (Grebe et al., 2017; T. W. Smith et al., 2013) evidence implicates OT's pivotal role in social behavior (Gouin et al., 2010) including couple interactions (Algoe et al., 2017; Schneiderman et al., 2014).

As most research focuses on the effects of exogenous OT administration (e.g., nasal spray) on communication or pair bonding (Ditzen et al., 2009; Flanagan et al., 2018; Jarnecke et al., 2018; Rilling et al., 2014), less is known, in humans, about the association between endogenous peripheral OT levels (e.g., in saliva or blood) and various aspects of social relationships (Crockford et al., 2014). Although it is still a matter of debate to what degree peripheral levels of OT are related to central levels (Macdonald & Feifel, 2013), there is increasing anatomical (Knobloch et al., 2012) and functional evidence (Wotjak et al., 1998) that the two are linked. A prior study of peripheral OT levels in a couple context revealed that the connections are complex and challenges the ubiquitous 'love story' to which OT is often reduced (van Anders, 2013). On the one hand, it has been associated with positive communication behaviors, affiliation, and social support in romantic relationships (Gouin et al., 2010; Light et al., 2005; Schneiderman et al., 2012), and studies show endogenous OT's ability to serve as 'rose-colored glasses' in the dyadic context, "attenuating the effect of a partner's behaviorally coded expressive behavior on perceptions of the expresser's responsiveness" (Algoe et al., 2017, p. 1763). On the other hand, peripheral OT levels have been associated with post-conflict anxiety as well as reduced forgiveness (Tabak et al., 2011). These contrasting findings point at the importance of considering context, such as situational and individual-based factors (Bartz et al., 2011; Grebe et al., 2017). Although the scope of studies examining the role of OT in romantic relationships and couple communication processes is expanding (Algoe et al., 2017), the context of discussion topic should also be taken into consideration, as research has also substantiated unique contributions of nonsexual and sexual communication to promoting couple's relational well-being (Mark & Jozkowski, 2013; Rehman et al., 2011; Rehman et al., 2017). The study of the association between OT and sexual communication is of particular importance, as past research has showed a strong interest in the study of OT's associations with several other dimensions of sexuality. Next we will describe some of the key findings of these studies.

1.4.2.2. Oxytocin and Sexuality.

The physiological and behavioral connections between OT and sexual and reproductive behavior in humans remain complex and understudied (Veening et al., 2015). For example,

while little is known about the influence of OT on sexual functioning, OT may influence the intensity of orgasm, and satisfaction after sex (Behnia et al., 2014). Although OT blood levels have been found to rise and reach a peak during orgasm, it is still unclear whether OT contributes to sexual arousal or whether it is a by-product of it (Veening et al., 2015). Since OT receptors have been found in the female and male reproductive system, including the internal and external reproductive organs (for an overview, see: Gimpl & Fahrenholz, 2001), it is possible that OT has a preparatory role in certain phases of the sexual response cycle (e.g., orgasm, ejaculation, and related muscle contractions).

The effects of OT on ejaculation may be exerted by peripheral OT receptors found in the testis, epididymis, vas deferens, prostate and penis, where they would affect the contractility of the smooth muscle cells involved in ejaculation. In addition, central effects of OT on the motor neurons in the spinal cord affecting the motor pattern involved in ejaculation have also been found in animal studies (Veening et al., 2015). High levels of OT may also play a role in the sexual satiety that occurs after orgasm, by saturating OT receptors and thus causing desensitization (Veening et al., 2015). When it comes to orgasms in women, it has been (controversially) proposed that the central release of OT during orgasm may have a facilitating effect on the transport of sperm cells through the vagina, with the aim of promoting fertilization, however this has not been supported by empirical studies (Levin, 2011). It should be noted that human semen also contains OT (Goverde et al., 1998), and there is no hard evidence that spermatozoa need any facilitation by orgasm-released OT, and research has even indicated that hastening the transport of spermatozoa can even inhibit fertility by polyspermy (ovum fertilization by more than one sperm) (Levin, 2017). In his review, Levin (2017) concludes that the anxiolytic functions of OT might be a better explanation for its possible orgasmic actions, which is in line with work by Taylor and colleagues (2010) who found higher endogenous OT levels in women facing pair-bond distress and Carter and colleagues (1997), who found stress reducing effects of exogenous OT administration.

As mentioned, our knowledge about the role of OT in social and relational processes is increasing, but, apart from associations with sexual response, to date, little is known about the influence of OT on intimacy, sexual behavior, and sexual satisfaction. However, the availability of intranasal OT and the development of more and more reliable methods to measure OT make this an area of research with great potential. Whether positive or negative associations are found may depend on several factors, including attachment orientation, feelings of security, and relationship quality. For this reason, it is important to keep in mind that the interaction between biological and relational processes is highly dependent on various contextual and psychosocial factors. As stated previously, there is a great paucity of studies investigating endogenous OT in the context of specific sexual domains, such as sexual communication, despite research highlighting OT's role in couple communication as well as sexual and social

behaviors. Hence, the road is open to fruitful scientific avenues investigating the effects of (endogenous or exogenous) OT, while also bridging the gap between sex research and the study of romantic attachment.

1.5. General Aims

Despite the clear relational dimension inherent to human sexuality, sex research has a long history of focusing on the individual and relationship research seldomly includes the study of sexual variables (Muise et al., 2018). Contemporary sex research seems to be more open to the introduction of a dyadic perspective (Dewitte, 2014), but the focus is still often on the application of a single-method approach (e.g., a questionnaire or a daily diary study). A multi-method approach that maps the interaction between sexual and relational processes on an individual and dyadic level, and on a psychological and neurophysiological level, has the potential to add a wealth of knowledge to the study of sexuality and romantic relationships. By incorporating data of both partners in a couple relationship, scientific research can better match the complex reality of sexuality in relationships (van Lankveld et al., 2014). Based on the current state-of-the-art, it can be argued that our knowledge about couple-level and individual-level processes involved in the sexual dimension of relationships is increasing, but its study remains fragmented. To date, the question of *how* and *for whom* sexual aspects of the relationship positively or negatively impact relationship quality remains largely unanswered. With this thesis, we aim to contribute a few stepping stones towards a better understanding of the importance of different, affective and behavioral, dimensions of a couple's sexual relationship to their experienced relational well-being.

1.6. Organization of the Thesis

Below we will present an outline of the following chapters.

Chapter Two summarizes the research aims, questions and hypotheses, and presents the anticipated impact of this work.

Chapter Three provides an overview of the study procedures and sample characteristics. This chapter also provides a short description of our general statistical approach.

The two chapters are followed by four chapters which present our empirical findings, based on four peer-reviewed articles. Chapter Four focuses on the contribution of sexual frequency and sexual communication to sexual and relationship satisfaction in the early stages of couple relationships using cross-sectional self-report data. The primary aim of this study was to investigate if the behavioral component and the affective component of a couple's

sexual relationship differentially impact sexual and relationship satisfaction in our sample of young, mixed-sex couples.

Chapter Five focuses on the impact of attachment dimensions on sexual behavior and relationship satisfaction. The main objective of this study was to examine how attachment dimensions of both partners influence the link between different behavioral characteristics of the sexual relationship (sexual behavior and intimate behavior) and relationship satisfaction in young, mixed-sex couples, highlighting the value of a dyadic approach.

Chapter Six examines couple communication during sexual and nonsexual discussions and their association with relationship satisfaction using observational methods (videotaped couple conflict discussions). The use of observational methods has several advantages, including the ability to capture and allow for the independent coding of both partners' communication behaviors. However, research applying observational methods has, with few exceptions, not distinguished between sexual and nonsexual communication behaviors. By addressing this gap in the literature, we aimed to unravel meaningful differences between both types of communication, and how they are associated with relationship satisfaction.

Chapter Seven combines self-report, observational, and hormonal methods to study the link between peripheral OT levels and observed communication behaviors during sexual and nonsexual conflict discussions in romantic relationships. In doing so, we hope to help pave the path towards a better comprehension of the physiological and neuroendocrine mechanisms underlying communication patterns in the early phases of romantic relationships.

Chapter Eight presents an overview and general discussion of our main findings, in which we interpret our studies' results in the context of the literature and how they contribute to and expand current knowledge. Clinical implications are outlined, strengths and limitations are discussed, as well as possibilities for future scientific inquiry.

CHAPTER TWO

THESIS OBJECTIVES

CHAPTER TWO: THESIS OBJECTIVES

2.1. Goals of Thesis

The main goal of this doctoral thesis is to contribute to our understanding of the associations among sexual and nonsexual relationship processes and relationship satisfaction in the early stages of romantic relationships, by using a multi-method approach. Sexuality is an important part of most relationships, yet surprisingly little is known about the processes and factors that explain how different aspects of dyadic sexuality may, and may not, have positive effects on relationship satisfaction. This doctoral thesis examines this topic, in a sample of young, mixed-sex couples in the first years of their relationship. We aim to improve our understanding of underlying mechanisms by investigating whether these associations are influenced by individual- and dyad-based variables, as well as by physiological factors. The research will be the first to distinguish between affective and behavioral dimensions of couples' sexual relationship and to examine their independent and shared contributions to relational outcome measures. The affective dimension of the sexual relationship is defined as the emotional reactions and expressive behaviors associated with the sexual relationship, including the affective characteristics of sexual communication. The behavioral dimension of the sexual relationship is operationalized as sexual and intimate behaviors, assessing a range of dyadic intimacy. The relative impact of both dimensions on relationship satisfaction is postulated to vary from couple to couple and is expected to be influenced by individual-based and couple-level processes.

2.2. Specific Aims

We pursued four specific aims:

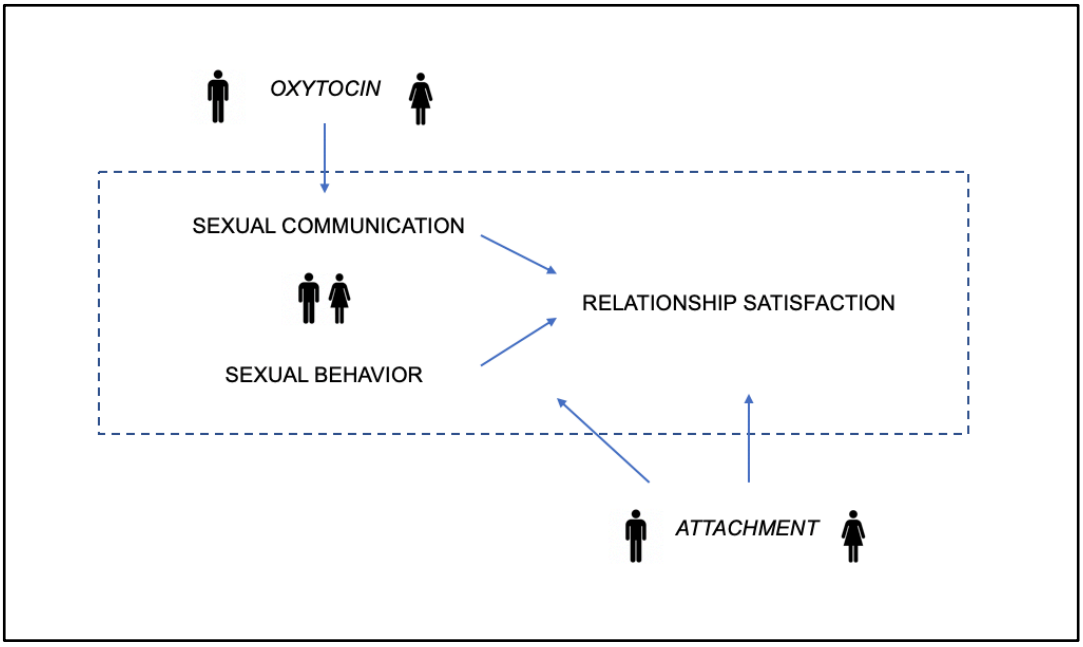
- *Aim 1*. Examine the importance of sexual frequency and sexual communication in young, mixed-sex couples in the early stages of their relationship (Chapter Four).
- *Aim 2*. Examine the associations between different sexual behaviors and relationship satisfaction and test the impact of individual variables (attachment) on these associations (Chapter Five).
- *Aim 3*. Examine the characteristics of observed couple communication behaviors during sexual and nonsexual discussions and their associations with relationship satisfaction (Chapter Six).
- *Aim 4*. Explore the association between OT and observed communication behaviors during sexual and nonsexual couple discussions (Chapter Seven).

2.3. Hypotheses

Figure 2.1. depicts a schematic overview of the couple-level and individual-based processes included in our analyses to address Aims 1 to 4. The behavioral component (e.g., sexual frequency and activities) and the affective component (e.g., observed or self-reported sexual communication) are both expected to contribute to relational outcome measures in our sample of young, mixed-sex couples in the early stages of their relationship (*Aim 1*). The association between sexual behavior and relationship satisfaction (*Aim 2*) is expected to be moderated by attachment orientations of both partners, with stronger associations between specifically sexual frequency and relationship quality in more anxiously attached individuals. We predicted that couples would adopt more positive and less negative behaviors during sexual, as compared to nonsexual, communication, and that observed positive behaviors during both discussions are associated with self-reported relationship satisfaction (*Aim 3*). We investigated OT's associations with communication behaviors during sexual and nonsexual discussions and predicted a significant correlation with prosocial communication behaviors. Based on the intimate nature of sexual communication, we also predicted stronger associations between OT levels and communication behaviors during sexual discussions (*Aim 4*).

Figure 2.1.

Schematic Overview of Study Variables



2.4. Outline of the Study Scope

This study examines the degree to which sexual aspects of the relationship influence relational outcome measures in a sample of young mixed-sex couples in the early stages of their relationship, while distinguishing between affective and behavioral dimensions of couples' sexual relationship and examining their individual and shared contributions. Although other variables, both intra- and interpersonal ones, may influence sexual and relationship satisfaction, these characteristics of the sexual relationship have consistently been found to be important to relational well-being, but have been either explored in isolation or with a focus on different relational outcome measures. Furthermore, we believe that a focus on these two dimensions is justified and relevant for clinical reasons as well, as is clarified in the introduction of this thesis (Chapter One).

The majority of sexual experiences occur in the context of established, monogamous relationships (Willetts et al., 2004) and studies, including longitudinal ones, have found that most changes in couple dynamics, especially those involving changes in sexual frequency, sexual satisfaction, and relationship satisfaction are expected to occur during the first years of a relationship (Call et al., 1995; Greenblat, 1983; McNulty et al., 2016). Hence, we are zooming in on those early stages of couple relationships, and only mixed-sex dyads within the first three years of their relationship were invited to participate. This cut-off was applied to minimize interpretative difficulties common in studies using more heterogeneous samples and to avoid high variability (e.g., in sexual orientation; in relationship duration). We elaborate on the rationale and consequences of limiting our sample to mixed-sex (i.e., heterosexual) couples in the general discussion of this thesis (Chapter Eight). Though we do not believe that some objective criterion for *early* relationships exists or that it would be met by or associated with absolute consensus, our choice for a 3-year mark is consistent with findings suggesting the 'honeymoon effect' for newlywed couples wears off after about 30 months (Lorber et al., 2015).

2.5. Advantages of the Approach

Our study approach addresses the need of a better liaison between sex research and relationship research using multimethodology (Dewitte, 2014; Muise et al., 2018). Most previous research has focused on self-report and individual-based assessments and variables (DeLamater & Hyde, 2004). To our knowledge, no research has ventured to study couple-level and individual-based processes of the sexual relationship via a combination of observational methods, physiological measures (e.g., OT), and in-lab questionnaires. By using dyadic research methods, including both partners in data collection and analyses, we contribute to advancing sex and relationship research beyond the individual.

Back in 1999, Gable and Reis (1999) stated that "a fundamental tenet of the field of personal relationships is that there is something special about the relationship that goes beyond the dispositional characteristics of the individuals involved" (p. 430). To date, examining how exactly both partners influence each other in their relational and sexual well-being is primordial to advance our understanding of what could be considered one of life's strongest emotional experiences: the romantic relationship (Fraley, 2019). Advances in statistical approaches have made it possible to examine these dyadic interactions. Our research is guided by the APIM (Kenny et al., 2006), one of the most widely used tools in dyadic relationship research for modeling interdependence between couple members. In contrast with a long history of sex research focusing on the individual, this model allows us to study sexuality dyadically, by examining how partners in a romantic relationship influence each other.

2.6. Research Significance and Impact

By delineating the relative impact of different characteristics of the sexual relationship on relational outcome measures, and the influence of individual-based and couple-level processes, this project hopes to enrich the under-represented dyadic study of human sexuality, offering contributions to both fundamental research and to clinicians working in the field of sex and relationship therapy.

CHAPTER THREE

DATASET AND GENERAL PROCEDURE

CHAPTER THREE: DATASET AND GENERAL PROCEDURE

3.1. Data Collection and Inclusion Criteria

For this project we recruited and collected the data of 126 mixed-sex couples (female-male dyads; *N* = 126 women and 126 men). A major part of the PhD research included the setup of a large longitudinal study with international collaborators (e.g., the Kinsey Institute Resource Center at Indiana University, USA). The data used for this thesis were taken from the first wave of data collection. Participants had to meet the following inclusion criteria: (a) between ages 18 to 30 years; (b) in a committed, heterosexual relationship for at most three years; (c) cohabitating or spending at least four nights a week together for no more than two years; (d) able to speak and read Dutch.

Individuals were excluded if they had cohabited with or been married to someone else before and if they had children or were pregnant. Only individuals who considered themselves as being in general good health were included; they were excluded if they were in treatment for sexual dysfunctions. 71 couples were excluded because one or both partners had cohabitated with another partner; 89 couples were excluded because they were together for more than 3 years; 39 individuals were excluded because they did not meet the criteria or their partner did not fill in the questionnaire; an additional 60 couples were excluded because one or both partners did not meet the age criterium.

The average age of the participants was 23.3 years (*SD* = 2.4; women: 22.7 years, *SD* = 2.2; men: 23.9 years, *SD* = 2.4). The average length of the relationship at the time of participation was 1.9 years (*SD* = 0.9). A total of 119 (94%) couples lived together and the remaining 7 couples spent on average 4.6 nights per week together. The average duration of cohabitation was 0.7 years (*SD* = 0.5). One couple was married. The majority of participants (98%) were White. One woman was Asian, and one woman and two men identified as African. Table 3.1. provides an overview of the key demographics.

3.2. General Procedure

Couples were recruited from the Flemish region of Belgium, including but not limited to the university town of Leuven. The study was advertised using posters and flyers that were distributed at universities, university hospitals, and in local businesses (e.g., bars, restaurants, theaters). In addition, advertisements were placed online (e.g., Facebook) and in local newspapers. Interested couples first filled out the online screening questionnaire. Eligible couples were contacted over the phone to schedule two research appointments in the first year (T0). During the first visit, a detailed description of the study protocol was provided and written informed consent was obtained, after which blood samples were taken. During the

second visit, the participants completed, in separate rooms, a series of questionnaires and were asked to engage in a sexual and a nonsexual discussion. The discussions took place in the newly established laboratory at the Institute for Family and Sexuality Studies, the first of its kind in Belgium. Afterwards, the couples were invited to complete follow-up questionnaires at home, every six months, for a total of two years (T0.5 – T1 – T1.5 – T2), the analyses of which are not included in this doctoral thesis. All study measures and procedures were reviewed and approved by the university's research ethics board.

Table 3.1.
Demographics

Variable	Women (N = 126)	Men (N = 126)
Age, years (±*SD*)	22.71 (±2.23)	23.88 (±2.43)
Relationship length, years (±*SD*)	1.89 (±0.88)	1.88 (±0.86)
Race, White	124 (98%)	124 (98%)
Job status		
Full-time job	37 (29%)	58 (46%)
Other (e.g., part-time, temporary job)	23 (18%)	21 (17%)
Unemployed	24 (19%)	20 (16%)
Student	42 (33%)	27 (21%)

3.3. Statistical Approach

All analyses were conducted using SPSS 25.0 (SPSS Inc., Chicago, IL, USA). We used a hierarchically structured, multilevel design, with individuals nested within couples. Specifically, we used mixed-model analyses to account for the interdependence of couple data, which allowed us to assess interactions between factors at different levels. We incorporated the use of APIM (Kenny et al., 2006), with couples as the unit of the analysis. In dyadic research, multilevel modeling via APIM is widely implemented for dealing with interdependence between couple members (Garcia et al., 2014; Muise et al., 2018). Using the data from both partners, APIM provides estimates for both actor effects (the effect of a participant's predictor variable on his or her own outcome variable) and partner effects (effect of a partner's predictor variable on the actor's outcome variable). For example, while women's sexual satisfaction may be associated with their own ratings of sexual communication (actor effect), APIM allows for the test of the impact of their male partner's ratings of sexual communication as well (partner effect).

CHAPTER FOUR

SEXUAL AND RELATIONSHIP SATISFACTION IN YOUNG, HETEROSEXUAL COUPLES: THE ROLE OF SEXUAL FREQUENCY AND SEXUAL COMMUNICATION

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ABSTRACT

Background. Although their individual contributions to sexual and relational outcomes are well-established, there has been a lack of research on the importance of sexual frequency and sexual communication to sexual and relationship satisfaction.

Aim. To examine the contribution of sexual frequency and sexual communication to sexual and relationship satisfaction in the early stages of couple relationships.

Methods. A sample of 126 young, heterosexual couples (Mean age = 23.3, *SD* = 2.4; average relationship duration = 1.9 years, *SD* = 0.9) filled out questionnaires about sexual frequency, sexual communication, and sexual and relationship satisfaction. Analyses were guided by the APIM.

Outcomes. Main outcome variables were sexual satisfaction and relationship satisfaction, measured by the Quality of Sex Inventory (QSI; Shaw & Rogge, 2015) and the Couple Satisfaction Index (CSI-32; Funk & Rogge, 2007), respectively.

Results. Analyses revealed a significant actor effect of both sexual communication and sexual frequency for sexual satisfaction. Only sexual communication, not sexual frequency, predicted relationship satisfaction. No significant partner or gender effects were found.

Clinical Translation. These findings lend support to the notion that couples could benefit from focusing on non-behavioral processes (e.g., sexual communication), rather than sexual behavior *per se*, when pursuing a fulfilling partnership.

Strengths & Limitations. Strengths of the study include the dyadic nature of the data and analyses, allowing for the evaluation of both individual- and couple-level processes. Also, to our knowledge, this is the first study to specifically examine the importance of sexual frequency and sexual communication to both sexual and relationship satisfaction. Limitations include the reliance on self-report measures and a relatively homogeneous sample.

Conclusion. Though both sexual frequency and sexual communication were relevant to the prediction of sexual satisfaction, only sexual communication predicted relationship satisfaction in this sample of young, heterosexual couples.

Keywords. Sexual frequency, sexual communication, sexual satisfaction, relationship satisfaction

Introduction

Sexuality is an integral part of most intimate relationships and an important contributor to couples' satisfaction levels (Butzer & Campbell, 2008; Sprecher & Cate, 2004). In addition, a positively evaluated sex life has been associated with increased well-being and life satisfaction in both partners (Schmiedeberg et al., 2017). Sexual frequency and sexual communication have independently been shown to contribute to sexual satisfaction (Velten & Margraf, 2017), with higher levels of sexual satisfaction being associated with higher frequencies of sex (Schoenfeld et al., 2017) and with greater sexual communication skills, including the ability to express one's sexual needs (Byers, 2011; Jones et al., 2018). Similarly, sexual frequency and sexual communication have each, individually, been found to be relevant to the prediction of relationship satisfaction (Jones et al., 2018; Muise, Schimmack, et al., 2016). However, most research to date tends to isolate possible predictors, without considering their possible interplay. Also, the few studies that included both sexual frequency and sexual communication as predictors, tested their association with sexual satisfaction, but not with relationship satisfaction (Velten & Margraf, 2017). Other studies, while examining effects on both sexual and relationship satisfaction, only included either sexual frequency or sexual communication as predictor (Byers, 2005). To our knowledge, the current study is the first to examine the contribution of both sexual frequency and sexual communication to sexual and relationship satisfaction in a sample of young, heterosexual couples.

Sexual Frequency

Research on long-term relationships, including marriage, has consistently found that the frequency of sexual interactions is highest during the first few years of the relationship, after which it tends to show a sharp decline (Argiolas & Melis, 2013; Call et al., 1995; McNulty et al., 2016; Rao & Demaris, 1995). Little is known, however, about the factors and processes that may help explain variability in sexual activity, and its association with sexual and relationship satisfaction, early in such relationships. McNulty, Wenner, and Fisher (2016) were among the first to investigate longitudinal associations between sexual frequency and sexual and relationship satisfaction at a dyadic level. In a sample of newlywed couples, they found that sexual and relationship satisfaction as well as sexual frequency decreased over time. More in general, higher sexual frequencies tend to be associated with greater sexual satisfaction in couples, and sexual frequency and satisfaction are positively associated with life satisfaction (Laumann et al., 1994; Schmiedeberg et al., 2017). With sexual frequency being considered an important predictor of sexual satisfaction (Baumeister et al., 2001; Pascoal et al., 2014; A. Smith, Lyons, et al., 2011), some studies have found no gender differences in this

positive association (Schoenfeld et al., 2017), while others found sexual frequency to be a significant positive predictor but only in women (Velten & Margraf, 2017).

Sexual frequency has also been linked to relationship (and marital) satisfaction. However, the association tends to be indirect (Meltzer & McNulty, 2010) and research suggests that, when it comes to being satisfied with one's general relationship, a 'warm interpersonal climate' and a satisfying sex life may matter more than high frequencies of sexual intercourse (Byers, 2005; Muise, Schimmack, et al., 2016; Schoenfeld et al., 2017). However, considering that both sexual frequency and relationship satisfaction tend to be highest during the early stages of romantic relationships (McNulty et al., 2016), and considering the positive association between sexual frequency and relationship satisfaction found in several studies (Byers, 2005; Call et al., 1995), we should allow for the possibility that the two are more strongly connected in young couples.

Sexual Communication

Whereas sexual frequency constitutes a quantitative indicator of a couple's sexual interactions, sexual communication represents a more qualitative dimension relevant to our understanding of the role of sexuality in romantic relationships (Byers, 2011; Velten & Margraf, 2017). While it is believed that, in heterosexual couples, men tend to initiate sexual activity more often than women do, higher satisfaction levels have been associated with more frequent sexual initiation by both partners, and by less frequent negative responses to a partner's initiative (Byers & Heinlein, 1989; Lau et al., 2006). Hence, being able to openly express one's sexual desires and addressing sexual concerns with one's partner can be considered advantageous, especially when partners have different preferences and expectations. As a number of studies have pointed at the beneficial effects of communication about sexual aspects of the relationship, studying the effects of both frequency and communication on couples' satisfaction levels seems justified (Muise et al., 2017; Muise et al., 2018).

In both men and women, more frequent and better communication has indeed been associated with higher sexual and relationship satisfaction (Jones et al., 2018). However, findings tend to vary depending on whether the focus is on sexual or on nonsexual communication (Mark & Jozkowski, 2013; Rehman et al., 2011). In general, communication between sexual partners has been found to be important to sexual satisfaction (Blunt-Vinti et al., 2019). Mutual disclosure is linked to greater sexual satisfaction as it may increase feelings of intimacy and connectedness in the couple (MacNeil & Byers, 2009) and increased communication between two partners is associated with higher levels of sexual satisfaction, whether this concerns general or sexual communication (Mark & Jozkowski, 2013). Others,

however, have reported the specific importance of communication about sex, in particular sexual needs and desires, for sexual satisfaction (Byers, 2011; Frederick et al., 2017; Montesi et al., 2010). Conversely, indirectness of communication about sexual intimacy has been associated with lower sexual satisfaction (Theiss, 2011).

Sexual communication has also been found to be predictive of general relationship satisfaction (Byers, 2005; Litzinger & Gordon, 2005; Yoo et al., 2014). In a study exploring the link between sexual and nonsexual communication and marital satisfaction using observational methods (Rehman et al., 2011), negative behaviors during sexual conversations were more strongly related to (lower) relationship satisfaction than those expressed during nonsexual conversations. Research has also found positive associations between sexual communication and orgasm frequency in women and higher sexual and relationship satisfaction in both men and women (Jones et al., 2018).

Current Study

Although other variables, both intra- and interpersonal ones, may influence sexual and relationship satisfaction, the current study specifically aims to investigate the effects of sexual frequency and sexual communication. The two variables have consistently been found to be important but have been either explored in isolation or with a focus on either sexual or relationship satisfaction, and not both. Furthermore, we believe that a focus on these two variables is justified and relevant for clinical reasons as well. Considering that some of the most common challenges in sex therapy involve couples not having sex as frequently as one or both partners would like and couples experiencing difficulties communicating about sex, therapy could benefit from addressing both sexual behavior and sexual communication (Chesney et al., 1981; Peplau, 2003). Indeed, for most sex therapists dealing with distressed couples, therapy goals tend to involve some combination of improving sexual communication and increasing sexual intimacy at the behavioral level (e.g., through exercises, home-work, sensate focus) (Greenberg, 2004; Jones et al., 2018; Masters & Johnson, 1970; Yoo et al., 2014). Yet, we still know relatively little about the importance of these different processes to relationship outcome measures, such as sexual and relationship satisfaction, which are also associated with therapeutic success (McCarthy et al., 2004). The current study aims to address this gap in the literature.

In the current study, we examine predictors of sexual and relationship satisfaction separately. Throughout the empirical literature, positive correlations between sexual and relationship satisfaction have been reported. At the same time, studies have found a disconnection, or potential independence, between the two – with some individuals reporting high relationship satisfaction and low sexual satisfaction, or vice versa (Apt et al., 1996) – and the strength of this association has been found to vary depending on factors such as

attachment style (Birnbaum et al., 2006; Butzer & Campbell, 2008) and couple communication (Litzinger & Gordon, 2005). Indeed, sexual and relationship satisfaction have been described as both theoretically and empirically distinct constructs, that are linked to (other) sexual and relationship processes in different ways (Fallis et al., 2016).

Relatedly, some research suggests that the influence of sexuality-related variables on relationship satisfaction is mediated by their impact on sexual satisfaction. However, other studies, especially longitudinal ones, have found that the relationship can be the other way around, or bidirectional (Byers, 2005; Cao et al., 2019; Fallis et al., 2016; MacNeil & Byers, 2009; McNulty et al., 2016; Yeh et al., 2006). Thus, the literature to date remains inconsistent and inconclusive about possible mediational processes. Although the directionality between sexual and relationship satisfaction constitutes a worthy subject of study, in the absence of clear theoretical frameworks on the primacy of either one variable, we believe that it is valuable to study predictors of each outcome variable, without focusing on possible mediation by one of the two.

Most previous work in this area has focused on individuals (Schmiedeberg et al., 2017; Schmiedeberg & Schroder, 2016) or on dyads in different, mostly later, stages of their relationship (Butzer & Campbell, 2008; Jones et al., 2018; Schoenfeld et al., 2017). In the current study, we focus on young, heterosexual couples while they are in their "earliest and often most dynamic years" (McNulty et al., 2016). Based on findings from studies that have focused on different components and combinations of variables, we hypothesize that both sexual frequency and sexual communication will contribute to the prediction of sexual satisfaction. In addition, although previous research – mostly conducted in more established relationships – has found less clear-cut effects of sexual frequency on relationship satisfaction, we expected both sexual frequency and sexual communication to contribute to relationship satisfaction in our sample of young, heterosexual couples.

Methods

Participants

The sample consisted of 126 heterosexual couples (N = 252; mean age = 23.29, SD = 2.40). The data are part of an ongoing longitudinal study and were taken from the first wave of data collection (T1). Couples were recruited from the Flemish region of Belgium, including but not limited to the university town of Leuven. The study was advertised using posters and flyers that were distributed at universities, university hospitals, and in local businesses (e.g., bars, restaurants, theaters). In addition, advertisements were placed online (e.g., Facebook) and in local newspapers. Participants had to meet the following inclusion criteria: (a) between ages 18 to 30 years; (b) in a committed, heterosexual relationship for at most three years; (c) cohabitating or spending at least four nights a week together for no more than two years; (d) able to speak and read Dutch. Individuals were excluded if they had cohabited with or been married to someone else before and if they had children or were pregnant. Only individuals who considered themselves as being in general good health were included; they were excluded if they were in treatment for sexual dysfunctions. These criteria were applied to minimize interpretative difficulties common in studies using more heterogeneous samples and to avoid high variability in relationship duration.

Main Outcome Measures

Demographics and Sexual History Questionnaire (DSHQ) (Janssen et al., 2013). This questionnaire covers general demographic characteristics (e.g., age, income, education), relationship and sexual variables (e.g., relationship duration, previous partner), and general physical and mental health. The questionnaire included questions assessing frequency of sexual and intimate activities. As in previous studies (Muise, Schimmack, et al., 2016; J. M. Twenge et al., 2017), participants were asked how often they engaged in such activities during the last 12 months. Response options ranged from *not once* (1), *once a month or less* (2), *several times a month* (3), *once or twice a week* (4), *a few times a week* (5), *once a day* (6), to *more than once a day* (7). For the current study, we focused on the following sexual behaviors: genital stimulation, receiving oral sex, giving oral sex, and penile-vaginal intercourse. We created a composite measure of sexual frequency by averaging across these four sexual behaviors (Cronbach α = .83 for women and α = .84 for men).

Dyadic Sexual Communication Scale (DSC) (Catania, 1998). This questionnaire measures how respondents perceive the discussion of sexual matters with their partners. It includes questions about whether they enjoy talking about sex and about the ease with which they can communicate their sexual preferences to their partner. For our study, we used the four-item version, as described by Catania (1998). Each item is rated on a 6-point Likert-type

scale ranging from 1 (*strongly disagree*) to 6 (*strongly agree*). The first 2 items, assessing communication problems, are reverse-coded. Sum scores can range from 4 to 24. Higher scores indicate better quality of sexual communication. The DSC has shown adequate psychometric properties, including adequate internal consistency, test-retest reliability, and discriminant validity (Catania, 1998). The Dutch version of the DSC has been used in several studies (Pazmany et al., 2014, 2015) and internal consistency, which tends to be lower when a scale exists of a relatively small number of items, was acceptable (Cronbach's α = .75 for women and .71 for men) in the current sample.

Quality of Sex Inventory (QSI) (Shaw & Rogge, 2016). This 24-item scale, which was developed using Item Response Theory, assesses sexual satisfaction and sexual dissatisfaction. Responses are given on a 6-point Likert-type scale ranging from 1 (*not at all true*) to 6 (*completely true*). In this study we only used the sexual satisfaction scale (12 items), for which responses are summed to create a total score, ranging from 0 to 60. Higher scores represent higher levels of sexual satisfaction. The original QSI subscales have demonstrated strong convergent validity with other measures of sexual satisfaction and excellent construct validity (Shaw & Rogge, 2016). The QSI was translated for the purposes of the current study, with excellent internal consistency (Cronbach's α = .95 for both women and men).

Couple Satisfaction Index (CSI) (Funk & Rogge, 2007). This 32-item scale, also developed using Item Response Theory, was used to measure relationship satisfaction. Using a 6-point Likert scale (1-6), responses are given to statements (e.g., "In general, how satisfied are you with your relationship?") and responses are summed to create a total score, ranging from 0 to 161. The original CSI scales demonstrated strong convergent validity with other measures of satisfaction and excellent construct validity (Funk & Rogge, 2007). The original CSI was translated for the purposes of the current study and showed excellent internal consistency (Cronbach's α = .94 for women and .94 for men in this study).

Procedure

Interested couples first filled out the online screening questionnaire. Eligible couples were contacted over the phone to schedule the first appointment. After written informed consent was obtained during this initial, introductory session, they were scheduled for a lab visit. During this visit they completed, in separate rooms, a series of questionnaires, which were presented on a PC using Qualtrics. Following this, the couples engaged in additional tasks, which will be reported on elsewhere. At the end of the session, couples were debriefed and each partner received €40 for their time. All study measures and procedures were reviewed and approved by the university's research ethics board.

Data Analytic Strategy

Analyses were conducted using SPSS 25.0 (SPSS Inc., Chicago, IL, USA). Prior to analysis, we conducted tests of interdependence. With gender being the distinguishing variable in heterosexual couples, Pearson product-moment correlations were calculated using the dyad members' scores. Correlations were +.38 for sexual satisfaction and +.49 for relationship satisfaction. As Cohen (1988) defines correlations of .3 as medium and those of .5 as a large effect, the results suggest interdependence of our data, supporting a dyadic approach to data analysis (Kenny et al., 2006). For the present study, we used a hierarchically structured, multilevel design, with individuals nested within couples. We used mixed-models analyses to account for the interdependence of couple data, which allowed us to assess interactions between factors at different levels (Kenny et al., 2006).

We incorporated the use of Kashy and Kenny's actor–partner interdependence model (APIM), with couples as the unit of the analysis (Kashy & Kenny, 2000). In dyadic research, multilevel modeling via APIM is widely implemented for dealing with interdependence between couple members (Garcia et al., 2014; Muise et al., 2018). Using the data from both partners, APIM provides estimates for both actor effects (the effect of a participant's predictor variable on his or her own outcome variable) and partner effects (effect of a partner's predictor variable on the actor's outcome variable). For example, while women's sexual satisfaction may be associated with their own ratings of sexual communication (actor effect), APIM allows for the test of the impact of their male partner's ratings of sexual communication as well (partner effect). In our study, we tested actor and partner effects of reports of sexual frequency and sexual communication using two separate APIM models. The first model (Figure 4.1.) focused on sexual satisfaction; the second model (Figure 4.2.) focused on relationship satisfaction. The two predictor variables, sexual communication and sexual frequency, were included in each model.

Results

Sample Characteristics

See Chapter Three: Dataset and General Procedure. Tables 4.1. and 4.2. provide the averages, reliability, correlations, and scoring range for this study's predictor and outcome variables.

Predicting Sexual and Relationship Satisfaction

Sexual Satisfaction

The deviance test for distinguishability for the model guiding our first analysis, shown in Figure 4.1., was significant ($\chi 2 = 11.37$, $df = 6$, $p = .001$). As this significant effect refutes the null hypothesis that the dyad members are indistinguishable, the sample was treated as distinguishable. Both sexual frequency[3] and sexual communication were grand-mean centered prior to analysis. We found significant actor effects of sexual communication and sexual frequency on sexual satisfaction for both men and women (see Table 4.3. and Figure 4.3.). None of the partner effects were significant (*p*s > .5). We found a significant difference in mean sexual satisfaction for men and women: men were more sexually satisfied than women. However, we did not find a significant gender effect for the predictor variables on the outcome variable, meaning there were no significant differences between men and women for actor or partner effects. Combined, the effects of sexual communication and sexual frequency accounted for approximately 29 percent of the variance in women and 31 percent of the variance in men.

Relationship Satisfaction

For our second model, shown in Figure 4.2., the deviance test for distinguishability was not significant ($\chi 2 = 4.32$, $df = 6$, $p = .63$). Therefore, we treated the dyads as indistinguishable. Multilevel modeling with restricted maximum likelihood was used to estimate the effects of sexual communication and sexual frequency on relationship satisfaction. Both sexual frequency and sexual communication were grand-mean centered prior to analysis. We found a significant actor effect for sexual communication only (see Table 4.4. and Figure 4.4.). None of the partner or gender effects were significant (*p*s > .07). The model accounted for 6 percent of the variance in relationship satisfaction.

[3] For the current study, we focused on the following sexual behaviors: genital stimulation, receiving oral sex, giving oral sex, and penile-vaginal intercourse. We created a composite measure of sexual frequency by averaging across these four sexual behaviors (Cronbach $\alpha = .83$ for women and $\alpha = .84$ for men).

Figure 4.1.

Hypothesized Model Linking Sexual Communication and Sexual Frequency to Sexual Satisfaction

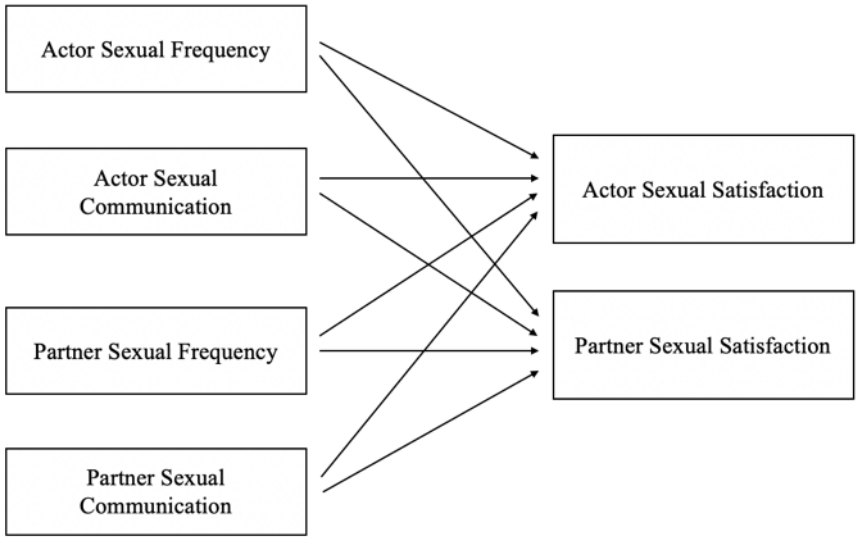


Figure 4.2.

Hypothesized Model Linking Sexual Communication and Sexual Frequency to Relationship Satisfaction

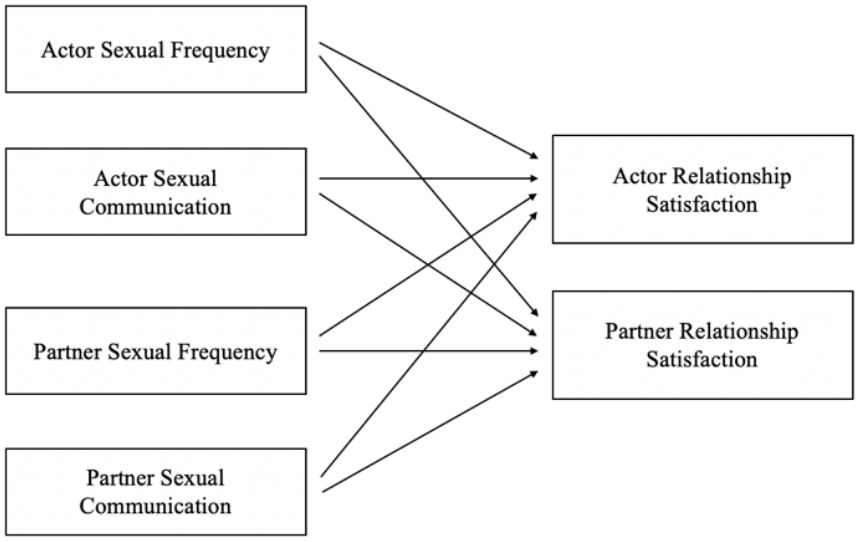


Table 4.1.

Descriptives and Cronbach Alpha for Predictor and Outcome Variables

Variable	Gender	*M* (±*SD*)	*Mdn* (IQR)	α	Possible Range	Actual Range
Sexual Frequency	F	4.0 (±0.9)	4 (1.5)	.83	1-7	2-6
	M	4.0 (±0.9)	4 (1.3)	.84		2-6
Sexual Communication	F	18.4 (±4.0)	19 (7)	.75	4-24	9-24
	M	18.5 (±3.6)	19 (5)	.71		8-24
Sexual Satisfaction	F	46.1 (±10.2)	47 (13)	.95	0-60	13-60
	M	48.8 (±9.2)	50 (10)	.95		15-60
Relationship Satisfaction	F	137.0 (±16.0)	141 (18)	.94	0-161	72-160
	M	134.9 (±16.1)	140 (19)	.94		82-159

Table 4.2.

Correlations Among Predictors and Outcomes

Study variables	1	2	3	4
1. Sexual Frequency	.82**	.38**	.36**	.14
2. Sexual Communication	.34**	.44**	.51**	.26**
3. Sexual Satisfaction	.44**	.46**	.38**	.52**
4. Relationship Satisfaction	.04	.20*	.54**	.49**

Note. Correlations for women appear above the diagonal; correlations for men appear below the diagonal. Correlations along the diagonal are between dyad members.

*$p \leq .05$, **$p \leq .01$.

Table 4.3.

APIM Parameter Estimates for Sexual Satisfaction

Predictor	***b***	***SE***	**β**	***t***
Actor Sexual Frequency	2.15*	.93	.20*	2.30
Partner Sexual Frequency	.65	.93	.03	.70
Actor Sexual Communication	.97***	.15	.37***	6.36
Partner Sexual Communication	.09	.15	.03	.58

Note. *b* = unstandardized regression coefficient, *SE* = standard error of unstandardized regression coefficient, β= standardized regression coefficient. *Df* = 163.77 for Actor sexual frequency; *df* = 164.70 for Partner sexual frequency; *df* = 236.75 for Actor sexual communication; *df* = 225.31 for Partner sexual communication. *$p \leq .05$, ***$p \leq .001$.

Table 4.4.

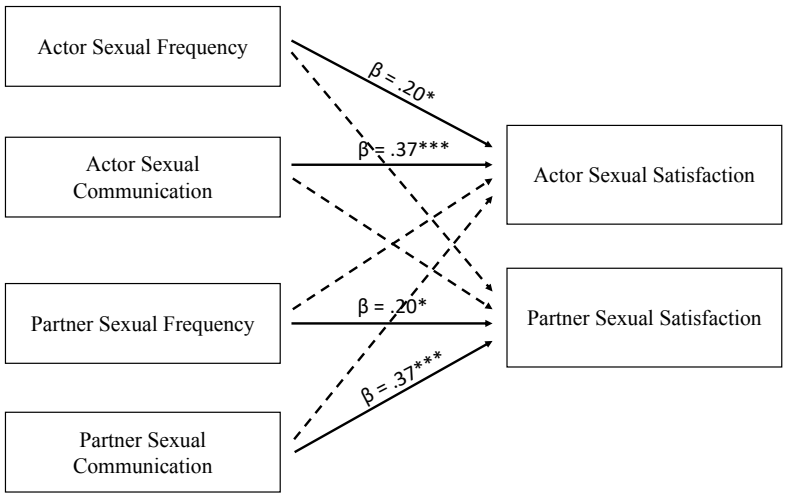
APIM Parameter Estimates for Relationship Satisfaction

Predictor	***b***	***SE***	**β**	***t***
Actor Sexual Frequency	2.48	1.51	.14	3.63
Partner Sexual Frequency	-2.75	1.51	-.15	-.23
Actor Sexual Communication	.99***	.27	.23***	1.64
Partner Sexual Communication	-.06	.27	-.01	-1.82

Note. *b* = unstandardized regression coefficient, *SE* = standard error of unstandardized regression coefficient, β = standardized regression coefficient. *Df* = 204.31 for sexual frequency and *df* = 238.98 for sexual communication. ***$p \leq .001$.

Figure 4.3.

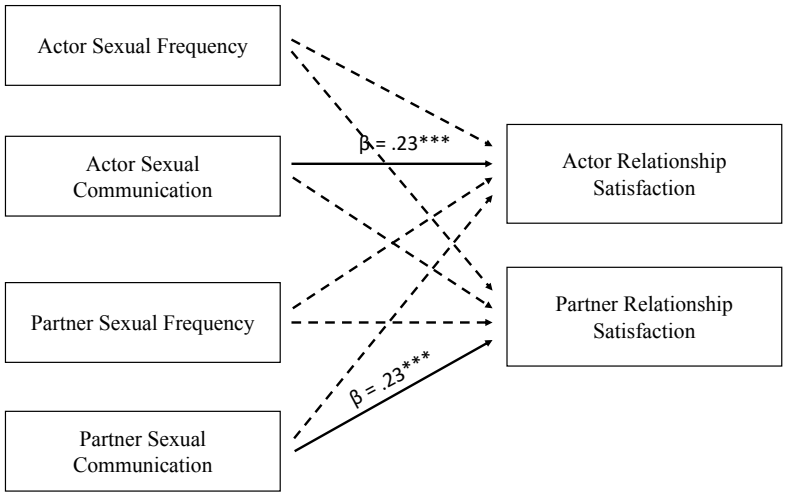
Standardized Actor Effects of Sexual Frequency and Sexual Communication as Predictors of Sexual Satisfaction



Note. $^{*}p \leq .05$, $^{***}p \leq .001$.

Figure 4.4.

The Standardized Actor Effects of Sexual Frequency and Sexual Communication as Predictors of Relationship Satisfaction



Note. $^{***}p \leq .001$.

Discussion

This study is the first to assess the contributions of both sexual communication and sexual frequency to both sexual and relationship satisfaction, in a sample of young, heterosexual couples. Whereas sexual communication has been found to be relevant to both sexual and relationship satisfaction (Jones et al., 2018), findings for sexual frequency have been more mixed (Schoenfeld et al., 2017). We found significant actor effects of sexual communication and sexual frequency for sexual satisfaction. These results are consistent with previous studies that included only one of the two predictor variables (Frederick et al., 2017; Jones et al., 2018; Schoenfeld et al., 2017; Theiss, 2011; Velten & Margraf, 2017). Interestingly, we found no differences between men and women, and we found no significant partner effects. Although the absence of partner effects is consistent with previous research (Velten & Margraf, 2017), the lack of gender effects contrasts with some previous studies which found gender differences in the association between sexual communication and relational outcomes (MacNeil & Byers, 2005) and in the association between sexual frequency and sexual satisfaction (Velten & Margraf, 2017). This difference may, in part, be explained by the fact that our sample consisted of young couples in the early stages of their relationship, whereas studies reporting gender differences focused on long-term relationships or included a wider age range or couples in different stages of their relationship.

In our second model, we also found significant actor effects of sexual communication in the prediction of relationship satisfaction, and again for both women and men. However, we found no significant effects of sexual frequency on relationship satisfaction. Thus, contrary to our hypothesis, which was based on previous studies revealing the importance of sexual frequency early in the relationship (McNulty et al., 2016; Muise, Schimmack, et al., 2016), we found that only sexual communication was important to the prediction of relationship satisfaction. Consistent with findings from previous research indicating that frequency of sexual intercourse is less important than other, nonsexual and positive interpersonal processes (e.g., a warm interpersonal climate) to relationship satisfaction (Byers, 2005; Schoenfeld et al., 2017), our results underscore and expand this idea by specifically pointing at the possible positive impact of sexual communication on this interpersonal climate.

Our findings add to the broader field of research on relationships and sexuality, which consistently emphasizes the importance of communication in romantic relationships. A growing number of studies indicate that specifically sexual, as compared to general, communication is important to both sexual and relationship satisfaction (Byers, 2011; Frederick et al., 2017; MacNeil & Byers, 2009; Montesi et al., 2010). Our findings are consistent with this and show that sexual communication outweighs sexual frequency in the prediction of relationship satisfaction.

By using separate models for sexual and relationship satisfaction, we were able to assess the specific contribution of sexual communication and sexual frequency to both types of satisfaction. The different patterns of results provide further support that sexual and relationship satisfaction, albeit often correlated, are linked to other processes – in the case of the current study, sexual frequency and communication – in different ways. The model explaining sexual satisfaction accounted for 29% of the variance in women's and 31% of the variance in men's sexual satisfaction. In contrast, the model explaining relationship satisfaction only accounted for 6% of the variance in both women and men. This low percentage of explained variance points at important differences in possible predictors of sexual and relationship satisfaction, leaving more to be discovered about which individual factors and relationship processes contribute more to the prediction of relationship satisfaction. In addition, it is possible that the variables used in this study would account for more variance in relationship satisfaction in different populations (e.g., couples with sexual difficulties).

Clinical Implications

In couples' therapy, sexuality-related problems are among the most prevalent presenting issues (Peplau, 2003). Yet, clinicians are often uncertain about how to best address these sexuality-related issues (Haboubi & Lincoln, 2003). Couple therapists frequently face the difficult task of integrating sex therapy interventions with couple therapy (McCarthy & Thestrup, 2008). For many professionals dealing with distressed couples, therapy tends to focus on improving communication (e.g., facilitating the expression of sexual wishes) and fostering intimacy (Yoo et al., 2014). Common sex therapy interventions include the use of exercises to enrich sexual experiences and enhance satisfaction (McCarthy & Thestrup, 2008). Thus, focusing on either sexual communication or on sexual behavior may contribute to more satisfying sexual relationships. Yet, to date, little is known about which components of therapy may have the greatest impact on therapeutic success. Whereas some, more behaviorally-oriented clinical approaches may mostly focus on the cultivation and promotion of positive sexual interactions (Costa & Brody, 2012), our findings emphasize the potentially positive impact of focusing on sexual communication and suggest that integrating sexual communication into couple therapy may improve both sexual and relational satisfaction.

Limitations and Future Directions

We used a composite measure for sexual frequency, averaging across different types of sexual interactions. Though internal consistency was high, focusing on more specific sexual behaviors (e.g., only penile-vaginal intercourse) could possibly have provided different results (Costa & Brody, 2012). Costa and Brody, for example, found that sexual and relationship satisfaction were associated with greater frequency of in particular penile-vaginal intercourse (Santilla et al., 2002). Future studies could explore the contribution of sexual communication and the frequencies of more specific sexual behaviors, and could expand this work by comparing partnered with solitary sexual activities. Also, in this study we asked each individual partner to estimate the frequency of sex, and we used these estimates as a mixed variable in our APIM model. Although sexual frequency could have been included as a between-dyad variable (e.g., by averaging the partners' answers), previous studies have found that men and women may report sexual frequency differently (Peplau, 2003). In the current study we found a relatively high (r = +.82) correlation between men and women's reports of sexual frequency. Yet, as this correlation explains approximately 70% of the shared variance, we considered individual, subjective interpretations of sexual frequency a more appropriate companion to the equally subjective assessment of one's sexual communication. Future studies could use measures that are less dependent on recall (e.g., daily diaries). Also, future studies could compare actual frequencies with preferred or desired frequencies of sex, as desired sexual frequency has been highlighted as a major factor in both sexual and relationship satisfaction (Smith, Lyons, et al., 2011).

Similar to sexual frequency, sexual communication was assessed using self-report measures. Although self-reports can be informative for understanding how a person perceives his or her communication, a number of factors and processes, including those related to social desirability, personality, and the capacity for introspection, could influence such reports (McNeil et al., 2018). Future research could benefit from the inclusion of other approaches, such as the observation and coding of couple conversations (Rehman et al., 2011; Rehman et al., 2017). Also, the translated versions of the questionnaires we used for the assessment of sexual and relationship satisfaction, although well-validated in their original form, could benefit from additional validation in future studies.

Our sample consisted of couples who were in good health and who were not in treatment for sexual disorders or relationship problems. We know very little about improving sexual communication or trying to change the frequency of various sexual behaviors from the perspective of clinical intervention, and since our data are cross-sectional, future research could explore the impact of therapeutic interventions using longitudinal analyses to examine if focusing on sexual communication would also outweigh behavioral interventions in the treatment of sexual or relational dissatisfaction.

We believe that the approach we used, exploring the relevance of predictor variables separately for both satisfaction types, can improve our understanding of their specific qualities and determinants. Future studies could test theoretically derived predictions on the interplay of different variables, and focus on possible mediation and moderation effects. Furthermore, longitudinal studies could help elucidate the direction of our effects, as some of the described associations could be bidirectional, with relationship satisfaction also predicting sexual frequency (Call et al., 1995) and possibly leading to better sexual communication. Similar observations could be made about the directionality between our predictors and sexual satisfaction (Byers, 2005; Sprecher, 2002), and between sexual and relationship satisfaction.

A final consideration involves the homogeneity of our sample, which consisted of heterosexual and mostly white men and women. Future studies could include a more diverse sample, in terms of ethnicity, education, and sexual orientation. Since our sample scored high on sexual frequency and sexual satisfaction, a final limitation concerns self-selection and ascertainment bias. Sexual frequency was generally high in our sample. Although the significant effect of sexual frequency on sexual satisfaction indicates that there was enough variability in sexual behavior, future studies could explore whether the association between sexual frequency and relationship satisfaction might be different in couples who, on average, have sex less frequently.

Conclusion

This study is the first to examine the contribution of both sexual frequency and sexual communication to both sexual and relationship satisfaction, in young, heterosexual couples. Sexual communication and sexual frequency both predicted sexual satisfaction, but only sexual communication predicted relationship satisfaction. Thus, while our study confirms the previously found connection between sexual frequency and sexual satisfaction, it shows that, when both are included in a single analysis, sexual communication outweighs the frequency of sex in the prediction of relationship satisfaction, even in a sample of young, heterosexual couples.

CHAPTER FIVE

ATTACHMENT ORIENTATIONS, SEXUAL BEHAVIOR, AND RELATIONSHIP SATISFACTION IN YOUNG, MIXED-SEX COUPLES: A DYADIC APPROACH

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ABSTRACT

We examined if and to what degree attachment orientations of both partners moderate the link between different behavioral characteristics of the sexual relationship and relationship satisfaction in the early stages of romantic attachment. A sample of 126 young, mixed-sex couples (N = 252, mean age = 23.3, SD = 2.4; average relationship duration = 1.9 years, SD = 0.9) filled out questionnaires assessing attachment anxiety and avoidance, a range of intimate and sexual couple behaviors, and relationship satisfaction. Exploratory factor analyses revealed two behavioral factors: Intimate behavior (kissing, cuddling) and sexual behavior (oral sex, coitus). Although frequency of sexual behavior was not directly associated with relationship satisfaction, we found a significant positive interaction with anxious attachment, indicating that higher frequencies of sexual behavior were associated with greater self-reported relationship satisfaction in more anxiously attached individuals. Exploration of the effects of intimate behaviors on relationship satisfaction revealed significant positive associations as well, but, unexpectedly, only for avoidantly attached individuals. These results call for a dyadic and differentiated approach to the study of sexuality in couples and are in line with prior findings that the impact of intimate and sexual behaviors on relationship satisfaction varies depending on attachment orientations.

Keywords. Attachment, sexuality, intimacy, satisfaction, couples.

Introduction

The link between sexuality and relationship outcomes continues to be of great interest to both sexuality and relationship researchers (Muise, Schimmack, et al., 2016; Schoenfeld et al., 2017). Individuals bring different experiences and characteristics, including adult attachment orientations, into their relationship and research increasingly shows the impact of such variables on relationship processes. Although attachment and sexuality have been theorized to involve separate systems (Schachner & Shaver, 2004; Shaver, & Mikulincer, 2006), the two are connected (Schachner & Shaver, 2004), and a growing number of studies focus on the association between attachment and various aspects of sexuality, including sexual behavior (Birnbaum, 2015; Birnbaum & Reis, 2018; Del Giudice, 2009). So far, however, most studies have focused on individual attachment orientations; research that incorporates *both* partners' attachment orientations remains limited (Muise et al., 2018). In addition, although sexual behavior has been a variable of interest and can be considered an important aspect of sexual health throughout life (Mercer, 2014), there is a surprising lack of research on how attachment orientations in couple relationships are associated with different behavioral manifestations of sexuality and intimacy (e.g., kissing; cuddling; oral sex; penetration) (Brennan et al., 1998; Busby et al., 2020; Little et al., 2010).

Attachment and the Sexual Relationship

In many if not most intimate relationships, romantic partners are both sexual partners and attachment figures (Hazan & Zeifman, 1994), and research has shown that attachment orientations can influence sexual motives, attitudes, and feelings, as well as sexual function, behavior, and satisfaction (Birnbaum & Reis, 2018; Gewirtz-Meydan & Finzi-Dottan, 2018; Mark et al., 2018; Peloquin et al., 2014). Most research on attachment in adults distinguishes between two dimensions, attachment anxiety and attachment avoidance (Fraley et al., 2000; Griffin & Bartholomew, 1994; Mario Mikulincer & Shaver, 2007a). Anxiety and avoidance, while both indicative of insecure attachment, can be considered different strategies to deal with the same underlying intra- and interpersonal uncertainty (Dewitte, 2012). Anxious attachment has been characterized by fear of rejection or abandonment by romantic partners (Fraley, 2019). Highly anxious individuals are more likely to have obsessive thoughts about their romantic partner, while highly avoidant individuals tend to be more emotionally detached and independent (Fraley, 2019).

Attachment orientations affect sexual relationships in different ways (Davis et al., 2004; Dewitte, 2012). Securely attached individuals, as compared to insecurely attached (high anxiety or avoidant) individuals, are more likely to use sex as a way to express love for their partner (Tracy et al., 2003), they tend to feel more comfortable with sexual intimacy, and they

experience more enjoyment from sexual interactions (Birnbaum, 2015; Hazan & Zeifman, 1994; Mikulincer & Shaver, 2003; Tracy et al., 2003). This translates into a greater openness to sexual exploration and more frequent sexual interactions (Hazan & Zeifman, 1994; Tracy et al., 2003). In contrast, less positive associations have been found for insecurely attached individuals, with both anxious and avoidant attachment orientations being associated with lower levels of sexual satisfaction and an increased likelihood of experiencing sexual problems (Butzer & Campbell, 2008; Khoury & Findlay, 2014; Peloquin et al., 2014).

Anxious and avoidant attachment orientations also have their own, unique associations with sexuality-related variables (Davis et al., 2006). For example, anxiously attached individuals tend to use sex as a way to address relationship doubts and uncertainty (Birnbaum et al., 2006), may yearn for sexual intimacy (Hazan & Zeifman, 1994), and are more inclined to equate love with sex (Impett et al., 2008). They may regard the frequency and quality of sexual activity as a reflection of relationship quality, with positive sexual experiences being comforting and reassuring and with disappointing sexual experiences indicating rejection (e.g., Birnbaum & Laser-Brandt, 2002; Birnbaum et al., 2006). When they feel insecure about their relationship, individuals scoring higher on attachment anxiety may express higher desire for and interest in sex with their partner (Davis et al., 2001; Impett, & Peplau, 2002). Also, a strong desire to feel valued sexually, combined with the prospect or fear of losing a partner, may make anxiously attached individuals more likely to engage in risky sexual behavior (Szielasko et al., 2013), to favor their partner's sexual preferences over their own (Davis et al., 2006), or to develop sexual problems (Gewirtz-Meydan & Finzi-Dottan, 2018).

In contrast, avoidantly attached individuals tend to separate sex from intimacy (Birnbaum et al., 2006), more easily pursue opportunistic sexual goals with less engagement (Davis et al., 2004), engage in more self-oriented sexual behavior such as masturbation (Bogaert & Sadava, 2002; Brassard et al., 2007), and more likely avoid intimate interactions in their relationships (Dewall et al., 2011). Their sexual motives are less likely based on a desire for affection and are more likely focused on reducing stress or satisfying one's partner (Birnbaum et al., 2006; Impett et al., 2008). Similar to anxiously attached individuals, however, avoidantly attached women and men tend to report lower sexual and relationship satisfaction than more securely attached individuals (Brassard et al., 2012; Butzer & Campbell, 2008; Peloquin et al., 2014).

Towards a Dyadic Approach

Beyond an individual's own attachment orientation, researchers have begun to explore connections between attachment and sexuality and relationship outcome measures while taking into account the attachment orientations of *both* partners. For example, in a sample of married couples, Butzer and Campbell (2008) found that attachment anxiety of the partner was associated with a stronger connection between one's own sexual and marital satisfaction, whereas attachment avoidance of the partner was a negative predictor of one's own sexual satisfaction. In a sample of couples seeking marital therapy, Brassard and colleagues (2012) found that anxious attachment in men predicted their female partner's sexual dissatisfaction, and attachment avoidance in women was associated with their male partner's sexual dissatisfaction. A more recent study by Conradi and colleagues (2017), involving both a community and a distressed sample of mixed-sex couples, found that across samples, relationship satisfaction in women and men was negatively associated with one's own attachment avoidance, and sexual satisfaction was negatively impacted by one's own as well as the partner's attachment avoidance. Also, relationship satisfaction was negatively impacted by partner scores on attachment avoidance, yet this was only the case for women. These findings highlight the importance of adopting a dyadic approach when studying the possible impact of individual characteristics on the sexual relationship. Moreover, the application of a dyadic approach can be considered an important step towards bridging the gap between relationship research, in which attachment theory has an important place but in which sexuality is often neglected, and sex research, which has a long tradition of focusing on individuals rather than couples (Dewitte, 2012, 2014; Muise et al., 2018).

Towards a Differentiated Approach

Physical contact plays a central part in attachment, caregiving, and sexuality; often described as the three behavioral systems comprising romantic love (Brennan et al., 1998). However, surprisingly little is known about how different behavioral expressions of sexuality and intimacy contribute to relational well-being. For example, Birnbaum and colleagues' study (2006), which focused on the experience of positive or negative feelings during sexual intercourse, did not include other intimate behaviors. In a recent study, Busby and colleagues (2020) found that the frequency of kissing was a strong predictor of both sexual quality and relationship connectivity, suggesting that "a simple question about kissing frequency may be one of the better barometers of both the day to day functioning of the sexual relationship and the global quality or connectivity occurring in the relationship" (p. 13). Hence, assessing different behavioral aspects of the sexual relationship, and differentiating between those behaviors, may help improve our understanding of the contribution of intimacy and sex on

relational outcomes (Brennan et al., 1998). In a sample of midlife couples, Fisher and colleagues (2015) found positive associations between self-reported relationship happiness and both the frequency of physical intimacy (e.g., kissing and cuddling) and sexual activity. Also, Heiman and colleagues (2011), in a sample of midlife and older couples found that the frequency of kissing and cuddling predicted relationship happiness in men and sexual satisfaction in both women and men. In the same study, sexual frequency was related to sexual satisfaction but not relationship happiness in both women and men. As the authors concluded, these results suggest "some independence of sexual activity and relationship satisfaction" (p. 751). Their findings are also in line with prior research in adolescent couples (Welsh et al., 2005), indicating a significant positive correlation between higher reports of kissing and higher reports of relationship satisfaction, even when controlling for other sexual behaviors (e.g., oral sex). However, more research is needed on how characteristics of both partners, including their attachment orientations, might influence such associations in the early stages of romantic attachment.

Limitations of Previous Research

Although progress has been made in elucidating the role of attachment in sexual and romantic relationships (Bogaert & Sadava, 2002; Brassard et al., 2012; Brassard et al., 2007; Butzer & Campbell, 2008; Conradi et al., 2017; Tracy et al., 2003), the current study, to our knowledge, is the first to utilize both a dyadic and a differentiated approach to the study of attachment and sexual behavior in the early stages of romantic relationships. In contrast to prior studies on attachment and couple sexuality that either did not assess sexual frequency (Butzer & Campbell, 2008), did not include attachment orientations of both partners (Little et al., 2010; van Lankveld et al., 2021), or did not assess relationship satisfaction (Brassard et al., 2012), the current study includes all of these variables, while differentiating between intimate and sexual behaviors. To date, only a few studies have included different types of intimate behaviors (e.g., Busby et al., 2020; Fisher et al., 2015; Heiman et al., 2011), yet not one of them examined intimate and sexual behaviors in the context of attachment theory. The current study further departs from previous work (e.g., Birnbaum et al. 2006; Little et al., 2010) in that it applies newer analytical techniques, including the actor-partner interdependence model (APIM) (Kenny et al., 2006), which allows for the simultaneous estimation of effects of each individual's characteristics on their own and their partner's satisfaction levels.

The Current Study

In summary, the current study explores how the potential impact of sexual interactions on relationship satisfaction in the early stages of couple relationships may be impacted by both partners' attachment orientations, while differentiating sexual from other intimate behaviors. We focus on young couples, in relatively new and less established relationships, as it allows for the exploration of the role of sexuality during what could be considered a critical period (Call et al., 1995; Greenblat, 1983; McNulty et al., 2016), in terms of relationship development, and may help unravel meaningful themes early in romantic attachment. Despite empirical support highlighting the role of sexuality in the first years of romantic attachment, there remains a paucity of scientific studies zooming in on these early stages of romantic relationships. Our main outcome variable is relationship satisfaction as an indicator of experienced relational well-being, which has been associated with physical and mental health (Miller et al., 2013; Robles, 2014).

We predict that individuals scoring high on attachment anxiety or attachment avoidance will report lower levels of relationship satisfaction and, similarly, that individuals with more anxiously attached or avoidantly attached partners will report lower levels of relationship satisfaction (*Hypothesis 1*). In addition, we predict the strongest associations between sexual behavior and relationship satisfaction in individuals who score high on attachment anxiety (*Hypothesis 2*). Finally, we tentatively predict sexual behavior (e.g., oral sex, vaginal sex), but not intimate behavior (e.g., kissing or hugging), to be associated with relationship satisfaction in anxiously attached individuals (*Hypothesis 3*). Considering that avoidantly attached individuals tend to separate sex from intimacy (Birnbaum et al., 2006) and are more likely to avoid intimate interactions in their relationships (Dewall et al., 2011), we expect a negative association between intimate behaviors and relationship satisfaction, in more avoidantly attached individuals (*Hypothesis 4*).

Methods

Participants

A total of 126 young, mixed-sex couples were included in this study (female-male dyads; $N = 252$; age $M = 23.29$ years, $SD = 2.40$). Table 1 provides an overview of the sample characteristics. The study was advertised using posters and flyers that were distributed at universities, university hospitals, and in local businesses (e.g., bars, restaurants, theaters). In addition, advertisements were placed online (e.g., Facebook) and in local newspapers. To be eligible for inclusion, participants had to meet the following inclusion criteria: (a) between

ages 18 to 30 years; (b) in a committed, heterosexual relationship for at most three years;[4] (c) cohabitating or spending at least four nights a week together for no more than two years; (d) able to speak and read Dutch. Individuals were excluded if they had cohabited with or been married to someone else before and if they had children or were pregnant. Only individuals who considered themselves as being in general good health were included; they were excluded if they were in treatment for sexual dysfunctions. These criteria were used to avoid high variability in relationship duration and to minimize interpretative difficulties that are common in studies with more heterogeneous samples.

Questionnaires

Demographics and Sexual History Questionnaire (DSHQ) (Janssen et al., 2013). This questionnaire covered general demographic characteristics (e.g., age, income, education), relationship and sexual variables (e.g., relationship duration, previous partner), and general physical and mental health. The questionnaire included 6 questions assessing frequency of specific sexual and intimate activities, including genital stimulation, receiving oral sex, giving oral sex, penile-vaginal intercourse, cuddling, and kissing. As in previous studies (Busby et al., 2020; Jones et al., 2018; McNulty et al., 2016; Muise, Schimmack, et al., 2016; J. M. Twenge et al., 2017), participants were asked how often they engaged in such activities during the last 12 months. Response options ranged from *Not once* (1), *Once a month or less* (2), *Several times a month* (3), *Once or twice a week* (4), *A few times a week* (5), *Once a day* (6), to *More than once a day* (7).

The Experience in Close Relationships Scale – Revised (ECR-R) (Fraley et al., 2000). This questionnaire contains 36 items assessing the dimensions of attachment anxiety and attachment avoidance. Participants responded using a 7-point Likert scale from 1 (*Strongly disagree*) to 7 (*Strongly agree*). Attachment anxiety and avoidance scores were computed using averages, with higher scores representing greater attachment anxiety and attachment avoidance, respectively. Examples of items on the Anxious attachment scale are "My partner makes me doubt myself" and "My partner only seems to notice me when I'm angry". Examples of items on the Avoidance attachment scale are "I would rather not be too confidential with my partner" and "I would rather not show my partner how I feel deep down". We used the Dutch translation and adaptation of the ECR-R (Conradi et al., 2006) and, for both scales, satisfactory reliability was found in the current sample (Attachment anxiety: Cronbach's α = .92 in women and .88 in men; Attachment avoidance: Cronbach's α = .90 in women and .89 in men).

[4] The choice for a 3-year mark is consistent with findings suggesting the 'honeymoon effect' for newlywed couples wears off after about 30 months (Lorber et al., 2015).

Couple Satisfaction Inventory (CSI) (Funk & Rogge, 2007). This 32-item scale, developed using Item Response Theory (Embretson & Reise, 2000), was used to measure relationship satisfaction. Using a 6-point Likert scale (1-6), responses are given to statements (e.g., "In general, how satisfied are you with your relationship?") and responses are summed to create a total score, ranging from 0 to 161. The original CSI demonstrated strong convergent validity with other measures of satisfaction and excellent construct validity (Funk & Rogge, 2007). The original CSI was translated for use in the current study and showed excellent internal consistency (Cronbach's α = .94 for women and .94 for men).

Procedure

Interested couples first filled out the online screening questionnaire. Eligible couples were contacted via telephone to schedule the first appointment. After written informed consent was obtained during this initial, introductory session, they were scheduled for a lab visit. During this visit they completed, in separate rooms, a series of questionnaires, which were presented on a PC using Qualtrics. Following this, the couples engaged in additional tasks, the findings of which will be reported elsewhere. At the end of the session, couples were debriefed and each partner received €40 for their time. All study measures and procedures were reviewed and approved by the university's research ethics board. Analyses were conducted using SPSS 25.0 (SPSS Inc., Chicago, IL, USA).

Results

Sexual and Intimate Behaviors

A principal axis factor analysis with oblique rotation (direct oblimin) was conducted on the six sexual and intimate behavior items. The Kaiser-Meyer-Olkin measure verified the sampling adequacy for the analysis (KMO = .69) and values for individual items were all above the lowest acceptable value of .50 (Kaiser, 1974). Bartlett's test of Sphericity was significant (p < .001), indicating that the variables were correlated and therefore suitable for factor analysis. An initial analysis was run to obtain eigenvalues for each factor in the data. Two factors had eigenvalues over Kaiser's criterion of 1 and together explained 70% of the variance. The skree plot showed inflexion that also justified retaining two factors. Factor 1 represents Sexual behavior and included the items receiving oral sex, giving oral sex, stimulating genitals, and penile-vaginal penetration. Factor 2 represents Intimate behavior and included the items cuddling and kissing. Table 5.1. presents the correlations among the six items and factor loadings after rotation and Tables 5.2. and 5.3. present descriptives for the key variables and the correlations among predictors, outcomes, and moderators, respectively.

Table 5.1.

Zero-Order Correlations Between the Six Behaviors and Factor loadings after rotation for Coded Communication Variable

		1	2	3	4	5	6	Factor 1: Sexual behavior	Factor 2: Intimate behavior
1.	Receiving oral sex	-						.83	-.15
2.	Giving oral sex	.71***	-					.76	-.13
3.	Stimulating genitals	.54***	.47***	-				.73	.19
4.	Vaginal penetration	.47***	.43***	.71***	-			.67	.21
5.	Cuddling	n.s.	n.s.	.19***	.23***	-		-.03	.66
6.	Kissing	n.s.	n.s.	.17**	.14*	.45***	-	.04	.64

Note. $N = 252$. ***$p \leq .001$, **$p \leq .01$, *$p \leq .05$.

Table 5.2.

Descriptives and Cronbach Alpha for Predictor and Outcome Variables

Variable	***Gender***	***M***	***SD***	**α**	**Range Potential**	**Range Actual**
Sexual behavior	F	3.96	.90	.83	1-7	2.0-6.3
	M	3.98	.91	.84		2.0-6.3
Intimate behavior	F	6.79	.46	.58	1-7	5.0-7.0
	M	6.78	.50	.58		4.0-7.0
Relationship	F	137.0	16.0	.94	0-161	72-160
satisfaction	M	134.9	16.1	.94		82-159
Attachment	F	3.2	1.1	.92	1-7	1.3-5.9
Anxiety	M	2.7	.9	.88		1.1-4.9
Attachment	F	2.1	.7	.90	1-7	1.1-5.3
Avoidance	M	2.4	.7	.89		1.0-5.6

Table 5.3.

Correlations Among Predictors, Outcomes, and Moderators

Study variables	**1**	**2**	**3**	**4**	**5**
1. Sexual behavior	**.82****	.23**	.04	-.08	.03
2. Intimate behavior	.04	**.42****	.11	.01	-.05
3. Relationship satisfaction	.14	.19*	**.49****	-.49**	-.49**
4. Attachment anxiety	-.01	.03	-.55**	**.01**	.42**
5. Attachment avoidance	-.01	-.06	-.47**	.41**	**.04**

Note. Correlations for women appear above the diagonal; correlations for men appear below the diagonal. Correlations along the diagonal are between dyad members.

*$p \leq .05$, **$p \leq .01$.

Associations between Sexual and Intimate Behavior and Relationship Satisfaction, moderated by Attachment Orientations

To account for the interdependence of couple data and to assess interactions between effects at different levels, Kashy and Kenny's actor-partner interdependence model (APIM) (Kashy & Kenny, 2000) was used. Using hierarchically structured, multilevel mixed-model analyses, with individuals nested within couples, APIM provides estimates for actor effects (the effect of Partner A's predictor variable on Partner A's outcome variable) as well as partner effects (effect of Partner A's predictor variable on Partner B's outcome variable).

Based on the results of our factor analysis, two separate models were tested using APIM. The first model (Model 1) focused on the possible moderation of the association between *sexual behavior* and relationship satisfaction by attachment orientation; the second model (Model 2) focused on the possible moderation of the association between *intimate behavior* and relationship satisfaction by attachment orientation.

In line with good APIM practice (see: Kenny et al., 2006), the predictors were grand-mean centered across all participants prior to analyses. Since attachment orientation is a mixed moderator, that varies both between and within dyads, there are two potential moderators of the estimated effects. Although sexual behavior and intimate behavior could have been included as a between-dyad variable (e.g., by averaging the partners' answers), previous studies have found that women and men may report sexual activity differently (Peplau, 2003). Hence, we used these estimates as a mixed variable in our APIM models. Considering the complexity of APIM moderation models involving distinguishable dyads and mixed moderators (Garcia et al., 2014), our reported results will be limited to actor sexual frequency, as an indicator of one's self-reported sexual activity, to facilitate reader interpretability and comprehension.

Model 1: Sexual Behavior

For the first model, we used relationship satisfaction as outcome, sexual behavior as predictor, and one's own and one's partner's attachment anxiety and avoidance scores as moderators. We included the interactions between attachment anxiety and avoidance both at the individual level and between partners as predictors of relationship satisfaction. We added all two-way interactions involving sexual behavior and the actor and partner effects of the

attachment orientations.[5] Table 5.4. shows the regression coefficients for the actor, partner, and moderation effects.

The analyses revealed significant main actor ($p < .001$) and partner ($p < .001$) effects of attachment anxiety and significant main actor effects ($p < .001$) of attachment avoidance on relationship satisfaction. Significant interactions emerged between actor and partner attachment avoidance ($p = .020$) and between attachment orientations at the individual level ($p = .003$). Following Aiken and West's (1991) recommendations for decomposing interactions between two continuous variables, we analyzed the simple slopes of these significant interactions.

At the dyadic level, the negative association between actor attachment avoidance and relationship satisfaction was significant for those in a relationship with a highly avoidantly attached partner (simple slope test, $b = -4.66$, $t(245) = -2.77$, $p = .006$) and those in a relationship with a less avoidantly attached partner (simple slope test, $b = -4.31$, $t(246) = -2.36$, $p = .020$). Additionally, participants in a relationship with a more avoidantly attached partner scored lower on overall relationship satisfaction than those with a less avoidantly attached partner (see Figure 5.1.).

The negative association between actor attachment anxiety and relationship satisfaction was significant for those who scored high on attachment avoidance (simple slope test, $b = -6.79$, $t(245) = -6.53$, $p < .001$) and those who scored low on attachment avoidance (simple slope test, $b = -2.92$, $t(246) = -2.71$, $p < .001$). Also, participants who scored higher on attachment avoidance, scored lower on overall relationship satisfaction than those who scored lower on attachment avoidance, see Figure 5.2.

Averaged across women and men, no significant main effects of sexual behavior on relationship satisfaction were found ($p = .87$). However, we did find significant interactions between sexual behavior and actors' anxious attachment ($p = .033$) for relationship satisfaction. As shown in Figure 5.3., sexual behavior and relationship satisfaction were significantly associated for participants that scored higher on attachment anxiety (simple slope test, $b = 4.49$, $t(245) = 3.25$, $p < .001$): individuals scoring high on attachment anxiety showed a significant positive correlation between sexual behavior and relationship satisfaction. Sexual behavior and relationship satisfaction were not significantly associated for participants that scored lower on attachment anxiety (simple slope test, $b = -1.65$, $t(245) = -1.14$, $p = .25$). Additionally, Figure 5.3. shows that participants scoring high on attachment anxiety overall scored lower on relationship satisfaction, than those scoring low on attachment anxiety.

[5] We also entered the 3-way interactions between the interactions of attachment, on the individual level and between partners, and sexual behavior, but as no significant 3-way interactions emerged we decided to not include them in the results.

Table 5.4.

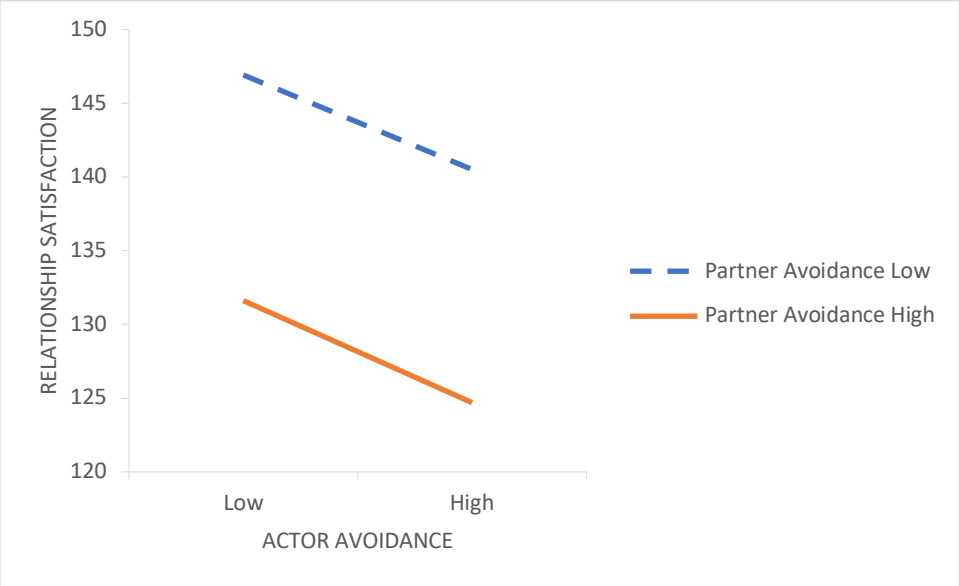
APIM Results: Effects of Sexual Behavior and Attachment Orientations on Relationship Satisfaction

Predictor	*b*	*SE*	ß	*t*
Sexual Behavior	.22	1.34	.016	.17
Actor Attachment Anxiety	-6.25***	.92	-.39***	-6.78
Partner Attachment Anxiety	-3.03***	.92	-.16***	-3.30
Actor Attachment Avoidance	-5.71***	1.30	-.24***	-4.40
Partner Attachment Avoidance	-.26	1.30	-.036	-.20
Actor Attachment Anxiety* Partner Attachment Anxiety	1.00	1.31	.041	.76
Actor Attachment Anxiety* Partner Attachment Avoidance	-1.06	1.19	-.045	-.89
Partner Attachment Anxiety* Actor Attachment Avoidance	-2.02	1.23	-.089	-1.64
Actor Attachment Avoidance* Partner Attachment Avoidance	5.31*	2.25	.18*	2.35
Actor Attachment Anxiety* Actor Attachment Avoidance	-3.73**	1.23	-.16**	-3.04
Partner Attachment Anxiety* Partner Attachment Avoidance	-.72	1.23	-.0019	-.59
Sexual Behavior* Actor Attachment Anxiety	2.18*	1.02	.15*	2.14
Sexual Behavior* Partner Attachment Anxiety	-.62	1.02	-.027	-.604
Sexual Behavior* Actor Attachment Avoidance	-.73	1.60	-.058	-.45
Sexual Behavior* Partner Attachment Avoidance	-.43	1.63	-.015	-.26
Sexual Behavior* Actor Attachment Anxiety* Partner Attachment Anxiety	-1.06	1.42	-.10	-.75
Sexual Behavior* Actor Attachment Avoidance* Partner Attachment Avoidance	-.072	3.47	.013	-.021
Sexual Behavior* Actor Attachment Anxiety* Partner Attachment Avoidance	1.203	1.73	.085	.70
Sexual Behavior* Partner Attachment Anxiety* Actor Attachment Avoidance	2.59	1.58	.11	1.63
Sexual Behavior* Actor Attachment Anxiety* Actor Attachment Avoidance	.061	1.67	-.00027	.036
Sexual Behavior* Partner Attachment Anxiety* Partner Attachment Avoidance	2.75	1.51	.11	1.82

Note. $N = 252$. *b* = unstandardized regression coefficient, *SE* = standard error of unstandardized regression coefficient. *df* = 201.04 for Sexual behavior, *df* = 192.34 for Attachment anxiety, *df* = 193.09 for Attachment avoidance. *$p \leq .05$, **$p \leq .01$, ***$p \leq .001$

Figure 5.1.

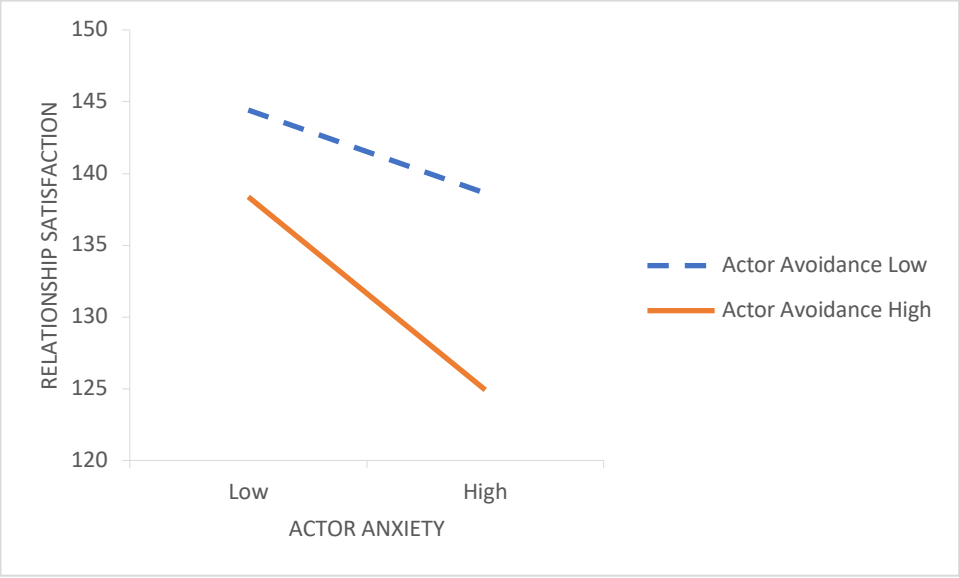
The Interaction of Actor Attachment Avoidance and Partner Avoidance Predicting Relationship Satisfaction



Note. Regression lines were plotted for individuals scoring 1 *SD* above and below the sample means on each of the predictor variables.

Figure 5.2.

The Interaction of Actor Attachment Anxiety and Actor Attachment Avoidance Predicting Relationship Satisfaction

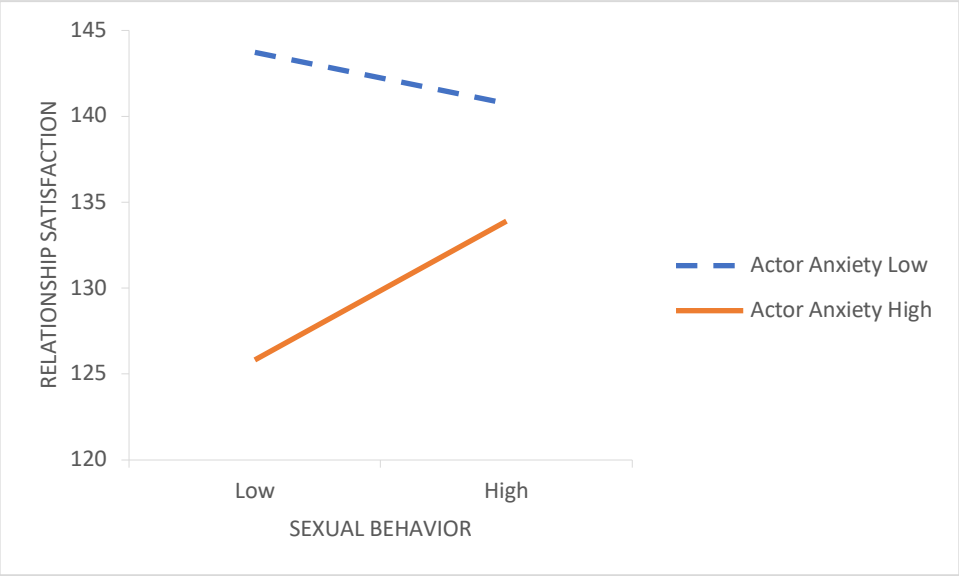


Note. Regression lines were plotted for individuals scoring 1 *SD* above and below the sample means on each of the predictor variables.

The deviance test for distinguishability for the model guiding our first analysis was not significant (χ^2 = 17.57, *df* = 21, p = .68), meaning the data are consistent with the null hypothesis that the dyad members are indistinguishable, hence the sample was treated as indistinguishable for the first model. This indicates that the results reported above were not qualified by gender and did not differ between women and men.[6] Together, main and moderation effects of both partners' reports on sexual behavior, attachment anxiety, and attachment avoidance, accounted for 55% of the variance in relationship satisfaction (*pseudo* R^2 = .55, χ^2 (21) = 137.69, $p < .001$).

Figure 5.3.

The Interaction of Sexual Behavior and Actor Attachment Anxiety Predicting Relationship Satisfaction



Note. Regression lines were plotted for individuals scoring 1 *SD* above and below the sample means on each of the predictor variables.

[6] Our approach to test for distinguishability, prior to making any statements on gender effects, is based on APIM guidelines (Kenny et al., 2006). This approach allows researchers to assess whether there are statistically significant differences as a function of the distinguishable variable (in this study: gender/sex), which helps simplifying already complex models.

Model 2: Intimate Behavior

For the second model, we used relationship satisfaction as outcome, intimate behavior as predictor, and one's own and one's partner's attachment anxiety and avoidance scores as moderators. Again, we included the main effects of both attachment orientations as well as the interactions between attachment anxiety and avoidance at the individual level and between partners as predictors of relationship satisfaction. We added all two-way interactions involving intimate behavior and the actor and partner effects of the attachment orientations.[7] The results of the main effects and two-way interactions of our second model are presented in Table 5.5.

The analysis revealed significant main actor ($p < .001$) and partner ($p < .001$) effects of attachment anxiety and significant main actor effects ($p < .001$) of attachment avoidance on relationship satisfaction. Significant interactions emerged between attachment orientations at the individual level ($p = .0025$). Since this pattern of results was similar as in our first model, discussed above, we refer to Figure 5.2. for the simple slope analysis and interpretation of this significant interaction. No significant interaction was found between actor and partner attachment avoidance ($p = .396$), nor were there other significant two-way interactions between attachment anxiety and avoidance at the individual level or between partners, predicting relationship satisfaction.

Averaged across women and men, a significant main effect was found of intimate behavior on relationship satisfaction ($p = .032$), indicating that more intimate behavior was associated with higher levels of relationship satisfaction. We found significant interactions between intimate behavior and actors' attachment avoidance ($p = .018$) for relationship satisfaction. As shown in Figure 5.4., intimate behavior and relationship satisfaction were significantly associated for participants that scored higher on attachment avoidance (simple slope test, $b = 9.44$, $t(245) = 3.27$, $p < .001$): individuals scoring high on attachment avoidance showed a significant positive correlation between intimate behavior and relationship satisfaction. Intimate behavior and relationship satisfaction were not significantly associated for participants that scored lower on attachment avoidance (simple slope test, $b = -2.69$, $t(245) = -0.91$, $p = .36$). Additionally, Figure 5.4. shows that participants scoring high on attachment avoidance scored lower on relationship satisfaction than those scoring low on attachment avoidance.

[7] We also entered the 3-way interactions between the interactions of attachment on the individual level and between partners, and intimate behavior, but again, no significant 3-way interactions emerged.

Table 5.5.

APIM Results: Effects of Intimate Behavior and Attachment Orientations on Relationship Satisfaction

Predictor	*b*	*SE*	ß	*t*
Intimate Behavior	5.33*	2.47	.15*	2.16
Actor Attachment Anxiety	-6.10***	.92	-.39***	-6.62
Partner Attachment Anxiety	-2.92***	.91	-.17***	-3.22
Actor Attachment Avoidance	-6.51***	1.35	-.25***	-4.82
Partner Attachment Avoidance	-.73	1.26	-.041	-.58
Actor Attachment Anxiety* Partner Attachment Anxiety	.55	1.28	.062	.43
Actor Attachment Anxiety* Partner Attachment Avoidance	-.74	1.25	-.053	-.59
Partner Attachment Anxiety* Actor Attachment Avoidance	-1.78	1.35	-.11	-1.32
Actor Attachment Avoidance* Partner Attachment Avoidance	2.57	3.03	.14	.85
Actor Attachment Anxiety* Actor Attachment Avoidance	-3.96**	1.29	-.17**	-3.056
Partner Attachment Anxiety* Partner Attachment Avoidance	-.66	1.22	-.043	-.54
Intimate Behavior* Actor Attachment Anxiety	-1.96	2.18	-.078	-.90
Intimate Behavior* Partner Attachment Anxiety	-2.38	2.13	-.071	-1.11
Intimate Behavior* Actor Attachment Avoidance	10.41**	4.36	.22**	2.39
Intimate Behavior* Partner Attachment Avoidance	.93	2.96	.020	.32
Intimate Behavior* Actor Attachment Anxiety* Partner Attachment Anxiety	6.41	3.51	.15	1.83
Intimate Behavior* Actor Attachment Avoidance* Partner Attachment Avoidance	9.67	11.40	.025	.85
Intimate Behavior* Actor Attachment Anxiety* Partner Attachment Avoidance	-3.17	3.36	-.038	-.94
Intimate Behavior* Partner Attachment Anxiety* Actor Attachment Avoidance	-.9984	4.48	.022	-.22
Intimate Behavior* Actor Attachment Anxiety* Actor Attachment Avoidance	-2.54	4.35	-.041	-.58
Intimate Behavior* Partner Attachment Anxiety* Partner Attachment Avoidance	-7.93	3.99	-.14	-1.99

Note. $N = 252$. *b* = unstandardized regression coefficient, *SE* = standard error of unstandardized regression coefficient. $df = 246.69$ for Intimate behavior, $df = 201.34$ for Attachment anxiety, $df = 219.61$ for Attachment avoidance. *$p \leq .05$, **$p \leq .01$, ***$p \leq .001$.

Figure 5.4.

The Interaction of Intimate Behavior and Actor Attachment Avoidance Predicting Relationship Satisfaction

Note. Regression lines were plotted for individuals scoring 1 *SD* above and below the sample means on each of the predictor variables.

The deviance test for distinguishability for the model guiding our second analysis was not significant ($\chi^2 = 13.04$, $df = 21$, $p = .91$), meaning that also for our second model, the sample should be treated as indistinguishable. This indicates that the results reported above were not qualified by gender and did not differ between women and men. Together, main and moderation effects of both partners' reports on intimate behavior, attachment anxiety, and attachment avoidance, accounted for 47% of the variance in relationship satisfaction (*pseudo* $R^2 = .47$, χ^2 (21) = 140.80, $p < .001$).

Discussion

This study focused on the relevance of attachment orientations of both partners to the connection between different behavioral characteristics of the sexual relationship and relationship satisfaction in a sample of young, mixed-sex couples in the early stages of their relationship. As in previous studies, we found that, on average, women scored higher on anxious attachment and men scored higher on avoidantly attached attachment (Bartholomew & Horowitz, 1991; Brassard et al., 2007; Del Giudice, 2011; Schmitt, 2003). Also in line with previous findings, we found a significant positive association between partners' own attachment anxiety and avoidance scores (Brassard et al., 2007; Del Giudice, 2011).

Attachment and Relationship Satisfaction

We found significant actor and partner effects of attachment anxiety and significant actor effects of attachment avoidance in both our models. These results indicate that women and men who scored higher on attachment anxiety or avoidance – or whose partner scored higher on attachment anxiety – reported lower levels of relationship satisfaction. These findings are consistent with findings from earlier studies in individuals (Birnbaum, 2007; Li & Chan, 2012; Lowyck et al., 2008) and couples (Carnelley et al., 1996; Feeney, 1999; Li & Chan, 2012). Additionally, we found significant interactions at the dyadic level between both partner's attachment avoidance, and between attachment orientations at the individual level.

At the dyadic level, a significant negative association was found between one's own attachment avoidance and satisfaction, regardless of one's partner's score on attachment avoidance. Additionally, our results also indicate that participants in a relationship with a more avoidantly attached partner scored significantly lower on overall relationship satisfaction than those with a less avoidantly attached partner, which is in line with prior research (Conradi et al., 2017; Feeney, 1999). Taken together, these findings support our first hypothesis, which predicted that individuals scoring high on attachment anxiety or avoidance would report lower levels of relationship satisfaction and, similarly, that individuals with more anxiously attached or avoidantly attached partners would report lower levels of relationship satisfaction. At the individual level, the link between attachment anxiety and relationship satisfaction was strong for the most avoidantly attached individuals, and weaker (though still significant) for individuals who were less avoidantly attached. Thus, in our sample of young, mixed-sex couples, specifically individuals scoring high on attachment anxiety *and* avoidance view their relationships as unsatisfactory.

Attachment as a Moderator of the Association Between Sexual Behavior and Relationship Satisfaction

Correlations between sexual behavior and relationship satisfaction were low and nonsignificant for both women and men. Similarly, we found no significant main effect of sexual behavior on relationship satisfaction in our first APIM model. These results are consistent with findings of previous studies, describing the limited direct effects of sexual frequency on relationship satisfaction, and highlight the importance of considering other factors (e.g., attachment orientations) in explaining the association between sexual behavior and relationship satisfaction (McNulty et al., 2016; Roels & Janssen, 2020; Schoenfeld et al., 2017).

We found a significant interaction between sexual behavior and actor anxious attachment, indicating a positive effect of sexual behavior on relationship satisfaction for more

anxiously attached individuals. This is in line with previous findings, suggesting that sexual aspects of the relationship may be used as an indicator of overall relationship quality in anxiously attached individuals, and as a way to cultivate or maintain relational reassurance (Birnbaum et al., 2006; Butzer & Campbell, 2008; Schachner & Shaver, 2004; Tracy et al., 2003). The inclusion of attachment orientations expands prior work (Muise, Schimmack, et al., 2016), as even in our sample of young couples, with sexual frequency averages of once or twice a week to a few times a week, we can see significant differences in how the frequency of sexual behavior impacts relational well-being, when considering individual traits such as attachment anxiety. In other words, the finding that greater sexual frequency is not linked with greater satisfaction does not seem to generalize as clearly across different attachment orientations.

Studies have linked anxious attachment to more frequent and intense sexual interactions with an emphasis on both physical and emotional involvement (J.A. Feeney & Noller, 2004; Hazan & Shaver, 1987). To some degree, our results can be taken to support the idea that for anxiously attached individuals "sex equals love", by suggesting that a higher sexual activity might contribute to a strong desire or even yearning for connectedness (Hazan et al., 1994). In line with this idea, studies have found that more anxiously attached individuals show more interest in sex when they feel insecure about their relationship (Impett, & Peplau, 2002).

Our findings confirm that sexual behavior and relationship satisfaction are not (as) strongly linked in avoidantly attached individuals (Butzer & Campbell, 2008). In our study, individuals scoring high on attachment avoidance, or whose partner scored high on attachment avoidance, were more likely to report lower relationship satisfaction (see above). However, one's own attachment avoidance score had no effect on the link between sexual behavior and relationship satisfaction. This is in line with the findings of Little and colleagues (2010), who found attachment avoidance was unassociated with marital satisfaction among partners who reported relatively high levels of sexual frequency (in their study, 0.37 *SD* above the average frequency).

Attachment as a Moderator of the Association Between Intimate Behavior and Relationship Satisfaction

We found low to moderate correlations between intimate behavior and relationship satisfaction, which were significant for men only. However, the APIM analysis (Model 2) showed a significant main effect of intimate behavior on relationship satisfaction, with no significant effect of gender. In contrast to our results with sexual behavior, these findings indicate a significant direct effect of intimate behavior on relationship satisfaction. Schoenfeld

and colleagues (2017) highlighted the importance of interpersonal nonsexual behavior (characterized by partners' positive and negative behaviors), rather than sexual frequency, in the evaluation of relationship satisfaction. In our study, intimate behavior included kissing and hugging, which can be considered displays of affection similar to the displays of positivity encompassed in Schoenfeld's study. Thus, our results seem to support the notion that intimate behavior can be more indicative of relational well-being, rather than sexual behavior *per se*.

In line with our third hypothesis, we did not find a significant interaction between intimate behavior and attachment anxiety. However, contrary to our fourth hypothesis, we did find a significant interaction between intimate behavior and actor attachment avoidance, indicating a positive association between intimate behavior and relationship satisfaction. Thus, although avoidantly attached individuals are more likely to have dissatisfying relationships, as seen in our study as well as prior research (Butzer & Campbell, 2008; Dunkley et al., 2016; Hazan & Shaver, 1987), intimate behaviors seem to contribute to relationship satisfaction, even in more avoidantly attached individuals. Surprisingly, this finding seems to be in juxtaposition to the prevailing idea that avoidantly attached individuals are less likely to enjoy 'presexual' activities such as cuddling and kissing (Birnbaum et al., 2006), and that anxiously attached individuals prefer these affective aspects of sexuality to sex itself (Birnbaum, 2010; Hazan et al., 1994). It is possible, however, that although more avoidantly attached individuals may avoid intimate interactions in their relationships (Dewall et al., 2011), intimate behaviors like hugging and kissing meet the minimal need of closeness necessary to positively evaluate one's relationship, and that a successful relationship for avoidantly attached individuals is not evaluated through sex, but rather through these intimate behaviors.

Regardless of how to best interpret these findings, they emphasize that sexuality and relational wellbeing are associated differently depending on attachment orientation. Our findings are in line with the predominant notion that avoidantly attached individuals prefer to minimize the role of sexuality in their relationship, by restricting sex or disconnecting it from the experience of intimacy (Birnbaum et al., 2006; Bogaert & Sadava, 2002; Brassard et al., 2007; Gentzler, 2004; Tracy et al., 2003). This "pattern of relative disconnection between sexual and relationship interactions" (Birnbaum et al., 2006, p. 941) suggests that individuals scoring high on attachment avoidance have motives other than a desire for closeness or intimacy to engage in sexual activity (Cooper et al., 2006; Impett et al., 2008; Schachner & Shaver, 2004). Also, avoidantly attached individuals appear to benefit from this relative separation of sexuality and intimacy, since negative sexual experiences within relationships do not seem to affect their overall relationship satisfaction to the same degree it does in others (Birnbaum et al., 2006; Butzer & Campbell, 2008). At the same time, however, this also means that avoidantly attached individuals may miss out on some of the potential beneficial effects

of sexual interactions with their partners. Our results hint at the possibility that these positive effects can be covered by intimate behaviors, rather than sexual behaviors *per se*. However, as these analyses were exploratory in nature, our findings are in need of replication and further exploration.

Clinical Implications

Sexuality-related problems are among the most prevalent presenting issues in couples therapy (Peplau, 2003). We believe our findings bear relevance to clinical practice as they suggest that, by taking both partners' attachment orientations into account, therapists can help create and increase mutual awareness of needs on the emotional, relational, and sexual level, and teach couples how to best address those needs. This could help prevent the potentially detrimental effects of attachment insecurities on relationships (S. M. Johnson & Whiffen, 2003). Emotionally Focused Therapy (EFT) is an example of the integration of attachment theory in couple counseling which aims to address both more general as well as sexual concerns (Greenberg, 2004). Instead of a focus on using sexual behavior as a coping mechanism, the emphasis of EFT is on restoring emotional security, after which sexual aspects of the relationship may thrive again, as a synchronous and coordinated consolidation of shared intimacy. EFT thus aims to help reframe inadequate sexual patterns as part of a dysfunctional couple dynamic, which can be transformed into a more functional dynamic and more secure bond (Brassard et al., 2012; S. Johnson & Zuccarini, 2010). A recent follow-up study (Wiebe et al., 2019) indicates that EFT can contribute to greater sexual well-being, by specifically reducing attachment avoidance. By targeting and facilitating emotional responsiveness and interdependence, EFT can be specifically beneficial in helping avoidantly attached individuals transform unsatisfactory relational experiences. Vice versa, sexual and intimate experiences can also buffer the negative impact of insecure attachment needs on relational outcomes, with positive experiences possibly mitigating underlying fears, thus strengthening the bond between the partners (Witherow et al., 2017). Our results encourage therapeutic sensitivity to which behaviors are targeted depending on which attachment needs are at stake, specifically sexual behavior in anxiously attached partners and intimate behavior in avoidantly attached partners. Yet future research as to how our findings translate to clinical practice is warranted, since our study involves a community and not a clinical sample.

Strengths, Limitations, and Future Directions

One of the strengths of our study is its dyadic nature, allowing for the evaluation of both individual- and couple-level processes. To our knowledge, this is the first study to specifically examine the moderating effects of both partners' attachment orientations on the relation between different behavioral characteristics of the sexual relationship and relational well-being in the early stages of romantic attachment. Similar to Brassard and colleagues (2012), the dyadic design allowed us to take both partners' effects and perceptions into account, in a single model. Additionally, by subdividing the behavioral characteristics of the sexual relationship in sexual behavior and intimate behavior, a theoretical distinction we confirmed by FA, we address a gap in the literature. Also, inviting couples to our lab and having them complete the questionnaires in separate rooms may have reduced social desirability and apprehension about possible reactions of one's partner (Birnbaum et al., 2006; Catania et al., 1990; Teitcher et al., 2015).

Despite these strengths, some limitations of our study should be acknowledged. First, the correlational nature of our data prohibits claims of causal relationships among variables. As some of the described associations could be bidirectional, with relationship satisfaction also predicting sexual frequency (Call et al., 1995), the application of longitudinal designs in the study of attachment, sexuality, and romantic relationships holds a promising future (Birnbaum & Reis, 2018; Brassard et al., 2012; Mikulincer et al., 2010; van Lankveld et al., 2021). Also, although the distinction between sexual and intimate behaviors constitutes a novel aspect of our research, our analyses were based on composite measures, and our intimate behavior factor was only based on two items, making it less reliable. Focusing on more specific sexual behaviors (e.g., only penile-vaginal intercourse) could possibly have provided different results (Costa & Brody, 2012). Costa and Brody, for example, found that sexual and relationship satisfaction were associated with greater frequency of in particular penile-vaginal intercourse. Future studies could include different dyadic as well as solitary sexual behaviors (e.g., masturbation), various relationship outcome measures, and other individual propensities and personality characteristics.

Also, future studies could compare actual frequencies with preferred or desired frequencies of sex, as desired sexual frequency has been highlighted as a major factor in both sexual and relationship satisfaction (A. Smith, Lyons, et al., 2011). We focused solely on sexual behaviors, since this was the primary goal of our study, and it should be noted that behaviors may have a complex relationship with how partners experience these behaviors. From an attachment perspective, the inclusion of both behavior and experience can offer a more detailed insight in underlying mechanisms (see also: Birnbaum et al., 2006). Since we were specifically interested in sexual behavior, future studies can build on our findings by including sexual feelings and other experiential variables, or other moderator variables such as

motivational and emotional variables to further unravel the links between sex, attachment, and relationships.

Finally, although the homogeneity of our sample minimized the influence of variables outside the scope of our research questions (e.g., sexual orientation, relationship duration, presence of children, sexual disorders) and same-sex couples were not included in our analyses due to constraints on recruitment and related sample size and analysis implications, future studies could include or compare more diverse samples, in terms of ethnicity and education as well as relationship duration and sexual orientation. Since our sample, in general, reported high sexual frequencies, a final limitation, common in sex research, concerns self-selection and ascertainment bias (Wiederman, 1999). Future studies could explore whether the association between sexual behaviors and relationship satisfaction might be different in couples who, on average, have sex less frequently, even in the early stages of their romantic relationship.

Conclusion

This study explores the relevance of attachment orientations of both partners to the connection between sexual behaviors and relationship satisfaction in a sample of young, mixed-sex couples in the early stages of their relationship. More anxiously attached and more avoidantly attached individuals reported lower levels of satisfaction in their relationship and participants with more anxiously attached or more avoidantly attached partners reported lower levels of relationship satisfaction. Individuals scoring high on attachment anxiety and avoidance view their relationships as unsatisfactory, yet no significant interaction was found between attachment anxiety and avoidance on a dyadic level. Differentiating between sexual and intimate behaviors, we found significant associations between sexual behavior and relationship satisfaction specific to individuals scoring high on attachment anxiety. Surprisingly, intimate behaviors were associated with relationship satisfaction, but only in more avoidantly attached individuals. Thus, our study confirms and contributes to the generally described impact of attachment orientations on the role of sexuality and intimacy in romantic relationships, yet challenges the predominant notion that avoidantly attached individuals prioritize sexual behavior over intimate behavior and vice versa for anxiously attached individuals. Though more research is needed to replicate and further explore these findings, preferably in more heterogenous and diverse samples, our findings underscore the value of applying a dyadic and differentiated approach to the study of attachment and sexuality in romantic relationships.

CHAPTER SIX

COUPLE COMMUNICATION BEHAVIORS DURING SEXUAL AND NONSEXUAL DISCUSSIONS AND THEIR ASSOCIATION WITH RELATIONSHIP SATISFACTION

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ABSTRACT

The quality of communication between romantic partners has consistently been found to be associated with relationship well-being and stability. Studies on sexual and nonsexual communication, however, have typically assessed communication skills and behaviors using self-report measures. The use of observational methods has several advantages, including the ability to capture and allow for the independent coding of both partners' communication behaviors. With few exceptions, research applying observational methods has not distinguished between sexual and nonsexual communication behaviors. In the present study, we asked 126 young, mixed-sex couples to engage in sexual and nonsexual conflict discussions. The two 7-minute discussions were videotaped and rated by trained coders on nine behavioral dimensions using an adaptation of the SPAFF (Gottman & Krokoff, 1989) and the SCIFF (Lindahl & Malik, 2001). Coder ratings applied to the discussion as a whole. Analyses included factor analysis on the behavioral dimensions and multilevel modeling incorporating the APIM. We found significant differences in how couples interacted during the two discussions, with more positive (affectionate and validating) and less negative behaviors during sexual discussions as compared to nonsexual discussions. In both women and men, expressions of positivity during the two types of conflict discussions were associated with higher relationship satisfaction. Gender differences were found in the association between negative behaviors during sexual discussions and relationship satisfaction, with men but not women's negative behaviors being associated with lower relationship satisfaction. These findings point at distinct qualities of sexual communication and its association with couples' relational well-being and contribute to a better scientific understanding, with clinical relevance, of sexual and nonsexual communication.

Keywords. Sexual communication, romantic relationships, observational methods, relationship satisfaction.

Introduction

Romantic relationships are a key component of individual well-being and are associated with lower mortality rates (Holt-Lunstad et al., 2010). However, not all relationships have positive effects on health. Relationship distress and conflict are risk factors for depression and can negatively impact physiological functioning and health outcomes (Kansky, 2018). It is not being in a romantic relationship *per se*, but rather the quality of that relationship that is associated with physical and mental health (Kiecolt-Glaser et al., 2010; Manley et al., 2014; Robles et al., 2014; Uchino et al., 1996). Given the impact that romantic relationships can have on physical health and psychological well-being, there has been a wealth of research investigating the interpersonal and individual factors that promote relationship quality (Karney & Bradbury, 1995). An important focus of this research has been to investigate how partners interact and communicate with each other.

In addition to the wide-ranging empirical support for the relevance of communication to the prediction of relationship outcomes (Gottman, 2014; Mark & Jozkowski, 2013; Montesi et al., 2010; Tan et al., 2017; Theiss, 2011), a range of theoretical perspectives conceptualize the quality and pattern of communication between romantic partners as a critical mechanism in the development and treatment of relationship problems. For instance, communication between partners is viewed as a causal mechanism in cognitive-behavioral (Baucom et al., 2019; Dugal et al., 2018), interpersonal (Clulow, 2018), and emotion-focused (Vazhappilly & Reyes, 2018) therapies of relationship problems, suggesting that this is a construct of transtheoretical significance (Cordova et al., 2005; Halford et al., 2001). In their review of common mechanisms of change across different approaches to couples therapy, Snyder and Halford (2012) noted that decreasing dysfunctional patterns of interaction is a universal process that is not specific to a particular theoretical approach to couples therapy.

Evidence suggests that certain relationship domains may be particularly important to relational well-being. The quality of a couple's sexual relationship is one such domain (Rehman et al., 2019; Sprecher et al., 2018). Both cross-sectional and longitudinal studies show that the quality of a couple's sexual relationship is one of the most important determinants of relationship quality and stability, resulting in greater individual and relational well-being (Fallis et al., 2016; McNulty et al., 2016; N. O. Rosen et al., 2020; Schmiedeberg et al., 2017). Couples' problems with or negative evaluation of their sexual relationship, including low sexual satisfaction, are among the strongest predictors of break-ups and divorce, and have been associated with psychological distress (Bean et al., 2020; Karney & Bradbury, 1995; McNulty et al., 2016). The current study starts from the premise that sexuality is a unique and critical component of romantic relationships; a domain that distinguishes romantic relationships from most other types of close relationships. With a majority of couples self-identifying as monogamous, most relationship partners hold the perspective that sexual needs

are to be met exclusively by the romantic partner and not by others (Fletcher et al., 2015; Ziegler et al., 2015). Yet, over the course of a relationship, couples may be confronted with changing needs and desires, regarding intimacy and sexuality, and how a couple communicates about and deals with such changes can shape and impact relational stability (Karney & Bradbury, 1995). The first goal of the current study is to observe how couples handle both sexuality-related and nonsexual conflicts in their relationship. Second, we investigate whether communication behaviors expressed during sexual and nonsexual conflict communication are associated with relationship satisfaction.

Observational Studies of Sexual and Nonsexual Communication

The most appropriate methodology for assessing communication depends on the specific questions examined (Noller & Feeney, 2003; Reisenzein et al., 2014). To this day, as stated by Muise and colleagues (2018), "in-lab interaction studies with both members of romantic couples have been important for moving research beyond self-report and incorporating more objective, behavioral assessments of live couple interactions" (p. 553). Indeed, the observational study of couple communication is associated with several advantages. For example, it offers the ability to capture and allow for independent coding of couple observations (Muise et al., 2018). Also, it does not rely on participants' perceptions of their own and their partner's communication skills or style, which can be influenced by a number of factors, including memory bias, gender heuristics, and individual traits. An example of a relevant individual trait is attachment orientation, which may result in over-reporting of communication problems and has been connected to hypervigilance in relationships and individual differences in observed sexual communication behavior (McNeil et al., 2018). Furthermore, individuals may change their behavior across contexts and communicate about different topics in different ways, without necessarily being aware of such changes, making them less likely to be revealed through self-report (Fletcher & Kerr, 2010). Finally, observational methods, in a sense, resemble clinical practice (Johnson et al., 2005), as the observation of couple interactions is an important aspect of the evaluation of both more constructive and destructive communication patterns in sex and relationship therapy.

In the vast majority of past observational studies on couples' communication, the specific topic of conflict, selected and discussed by couples, has received little attention (Heyman, 2001). To date, only three studies have applied observational methods to the study of sexual communication, and only two of these examined both sexual and nonsexual couple communication (McNeil et al., 2018; Rehman et al., 2011; Rehman et al., 2017). Rehman and colleagues (2011) found that negative behaviors during sexual discussions (e.g., contempt,

belligerence) were more strongly associated with relationship distress than those expressed during nonsexual discussions. Although this study involved a sample of only 15 couples, the findings suggested that communication patterns during sexual couple discussions, and especially negative expressions and behaviors during such discussions, may be particularly sensitive markers of relationship (dis)satisfaction.

More recently, Rehman and colleagues (2017) compared communication patterns during sexual and nonsexual discussions in a sample of 115 couples and reasoned that partners may respond adaptively to the experience of threat by engaging in behaviors that signal non-threat (e.g., expressions of warmth and affection). In their study, they found that couples reported higher levels of anxiety before sexual, as compared to nonsexual, conflict discussions. In addition, partners displayed greater warmth during the sexual discussions. These findings are in line with prior research indicating sexual self-disclosure may be experienced as delicate and difficult, even in the context of long-term relationships (MacNeil & Byers, 2009). Also, compared to other types of relationship conflicts, sexual conflicts are often considered more difficult to address by both couples and therapists (MacNeil & Byers, 2009; Sanford, 2003). Sexual communication may also be avoided out of fear that such communication could reveal incompatibilities that could threaten the stability of the relationship. Additionally, sexual self-disclosure can involve the revelation of aspects of the self that are deeply personal and private and leave an individual feeling vulnerable. For example, sharing a sexual preference that may be viewed as atypical or peculiar by the partner may evoke fear of rejection. In short, these results point at important differences in how sexual versus nonsexual conflict discussions are experienced and navigated by romantic partners.

Current Study

The current study builds upon previous research in several important ways. First, the observational study of human sexuality in the context of romantic relationships remains underrepresented in the empirical literature, and the study of sexual communication still relies predominantly on the use of questionnaire and other self-report data. Hence, the current study adds to a small but emergent literature on observational research on sexual communication in the context of romantic relationships.

At the same time, the current study aims to address some limitations of past studies comparing sexual and nonsexual communication patterns. The present study builds on a pilot study (Rehman et al., 2011), which investigated the link between observed sexual and nonsexual communication behaviors and relationship satisfaction, in a limited sample size (N = 15 couples). More recent work by Rehman and colleagues (2017), examined differences in observed communication behaviors in a larger sample size (N = 115 couples), however, they did not examine the association with relationship satisfaction. Moreover, the current study

focuses on couples in the early stages of their relationship. Rehman and colleagues (2017) assessed couples who had been together, on average, for more than 10 years. Studies, including longitudinal ones, have found that the strongest decline in sexual and relationship satisfaction occurs during the first few years of a relationship (Call et al., 1995; Greenblat, 1983; McNulty et al., 2016). Thus, focusing on new and less established relationships allows for the exploration of the role of sexual and nonsexual communication during what could be considered a critical period, in terms of relationship development, and may reveal meaningful themes more specific to the early stages of romantic relationships.

Research Questions

The study was designed to address two main research goals. First, we wanted to compare couples' communication behaviors during sexual and nonsexual conflict discussions. Based on the literature described above, we predicted that couples would adopt more positive (e.g., affection) and less negative (e.g., contempt) behaviors or affective expressions during sexual, as compared to nonsexual, conflict discussions. Our second research goal was to examine the degree to which observed communication behaviors during sexual and nonsexual couple discussions are associated with relationship satisfaction. We expected positive behaviors during both sexual and nonsexual discussion to be positively associated with relationship satisfaction. This prediction was based on past self-report and observational studies, which found that more constructive sexual and nonsexual communication is associated with higher relationship quality.

The current study contributes to the literature by including positive and negative communication behaviors that have not been investigated in past observational studies of sexual communication, such as annoyance, irritability and frustration, and lightness. If, as predicted, these behaviors demonstrate a similar pattern to the behaviors investigated in past observational studies of couples' communication, this will provide converging evidence for the link between observed behaviors during sexual and nonsexual communication and relationship quality.

Methods

Participants

The sample consisted of 126 mixed-sex couples (female-male dyads; N = 126 women and 126 men). The data are part of an ongoing longitudinal study and were taken from the first wave of data collection. Couples were recruited from the Flemish region of Belgium, including, but not limited to, the university town of Leuven. The study was advertised using posters and

flyers that were distributed at universities, university hospitals, and in local businesses (e.g., bars, restaurants, theaters). In addition, advertisements were placed online (e.g., Facebook) and in local newspapers. Because the current study focused on young romantic partners in the early stage of their relationship, participants had to meet the following inclusion criteria in order to be eligible to participate: (a) between ages 18 to 30 years; (b) in a committed, mixed-sex relationship for, at most, three years[8]; (c) cohabitating, or spending at least four nights a week together, for no more than two years; (d) able to speak and read Dutch. Individuals were excluded if they had cohabited with or been married to someone else before and if they had children or were pregnant, and if they were currently in treatment for sexual dysfunctions.

The average age of the participants was 23.3 years (*SD* = 2.4; women: 22.7 years, *SD* = 2.2; men: 23.9 years, *SD* = 2.4). The average length of the relationship at the time of participation was 1.9 years (*SD* = 0.9). A total of 119 (94%) couples lived together and the remaining 7 couples spent on average 4.6 nights per week together. The average duration of cohabitation was 0.7 years (*SD* = 0.5). One couple was married. The majority of participants (98%) were White. One woman was Asian, and one woman and two men identified as African. Table 1 provides an overview of the key demographics.

Questionnaires

Demographics and Sexual History Questionnaire (DSHQ) (Janssen et al., 2013). This questionnaire covers general demographic characteristics (e.g., age, income, education), relationship and sexual variables (e.g., relationship duration, previous partner), and general physical and mental health.

Areas of Change Questionnaire (ACQ) (Margolin et al., 1983). In the present study, we used the ACQ to determine topics for the two conflict discussions (sexual and nonsexual). On a 7-point Likert-type scale ranging from 1 (*much more*) to 7 (*much less*), with 4 representing no desired change, participants were asked to rate how much they would like their spouses to change in various areas (e.g., expressing emotions, meeting up with friends or family). Responses were recoded such that higher numbers represent greater desired change. Similar to a prior pilot study (Rehman et al., 2011), we modified the ACQ to include a total of nine sexual topics (e.g., pay more/less attention to one's sexual needs; show more/less interest in sex; be more/less experimental). In addition, a question was added to assess the importance of each topic to the participant on a scale from 1 (*not at all*) to 10 (*very important*), as well as another question which asked participants to indicate whether or not they would feel comfortable discussing this topic in our study.

[8] The choice for a 3-year mark is consistent with findings suggesting the 'honeymoon effect' for newlywed couples wears off after about 30 months (Lorber et al., 2015).

Couple Satisfaction Index (CSI-32) (Funk & Rogge, 2007). This 32-item scale, developed using Item Response Theory (Embretson & Reise, 2000), was used to measure relationship satisfaction. Using a 6-point Likert scale (1-6), responses are given to statements (e.g., "In general, how satisfied are you with your relationship?") and responses are summed to create a total score, ranging from 0 to 161, with higher scores representing greater relationship satisfaction. The original CSI scales demonstrated strong convergent validity with other measures of satisfaction and excellent construct validity (Funk & Rogge, 2007). The original CSI was translated for use in the current study and showed excellent internal consistency (Cronbach's α = .94 for women and .94 for men).

Procedure

All study measures and procedures were reviewed and approved by the university's research ethics board. Interested couples first filled out the online screening questionnaire. Eligible couples were contacted via telephone to schedule two visits. During the first visit, a detailed description of the study protocol was provided and written informed consent was obtained. During the second visit, the participants completed, in separate rooms, a series of questionnaires and were asked to engage in a sexual and a nonsexual discussion.

Topic selection was based on both partners' individual responses to the ACQ, which they completed in separate rooms. The researchers compared both partners' responses and selected the topics that scored highest on (discrepancy in) desired change and on topic importance. The desired change needed to be different or in the opposite direction, so the discussions would reflect disagreements rather than mutually agreed-upon need for change, in terms of level or direction. For example, Partner A might desire more and Partner B less sexual activity, instead of both partners desiring more sexual activity. Additionally, the sum of topic importance scores was used to select the topic with the highest rated importance for both partners. Participants could indicate whether they were willing to discuss each topic and they could veto topics they did not want to discuss. After the researchers identified topics based on participants' responses to the ACQ, the researchers consulted with each partner individually to confirm they both were willing to discuss the selected topics. If a partner or couple was reluctant to discuss the selected topic, the topic with the second highest rating was offered as an alternative (see Appendix A of the supplemental materials for an overview of topic selection and times a topic was vetoed by one of the partners).

After topic selection, both partners were reunited and brought into an observation lab, which was decorated in an attempt to replicate the experience of being at home, in a lounge or living room. Couples were then asked to engage in 7-minute sexual and nonsexual conflict discussions, the order of which was counterbalanced across couples. The couple interactions were timed by the experimenter and recorded using small, wall-mounted video cameras (AXIS

M1124) and a Philips meeting microphone (LFH9172/00). Specialized software (The Observer XT 12 and MediaRecorder 2.0 by Noldus) was used to record and monitor, using split-screen technology, the couple discussions. At the end of the second visit, couples were debriefed, and each partner received €40 for their time. The entire procedure, including the completion of the questionnaires, took approximately two hours.[9]

Coding

Coding Protocol

The system that was used to code the observational data (see Appendix B of the supplemental materials) was based, in part, on the Specific Affect Coding System (SPAFF) (Gottman & Krokoff, 1989), a widely used system for coding couple interactions, and the System for Coding Interactions and Family Functioning (SCIFF) (Lindahl & Malik, 2001). While the SCIFF is a dimensional coding system, the original SPAFF is a categorical system that captures discrete categories of behavior. In order to code the affective states from the SPAFF dimensionally, we relied on previous studies and manuals that have adapted SPAFF codes to dimensional rating systems (Johnson, 2002; McNeil et al., 2018). In addition to codes that were adapted from these coding systems, we included two new codes, related to annoyance: irritability and frustration (1), and lightness (2), resulting in a total of four negative and five positive codes.

The four negative dimensions were: (a) contemptuous behaviors; (b) domineering and belligerent behaviors; (c) annoyance, irritability, and frustration; and (d) overall level of conflict. The first two, 'contemptuous behaviors' and 'domineering and belligerent behaviors,' were based on the SPAFF coding system (Gottman & Krokoff, 1989). We included a code for 'annoyance, irritability, and frustration' to capture more subtle, low-level negative affect (Gottman & Krokoff, 1989; Julien et al., 1989). The final negative code, 'overall level of conflict,' was based on the SCIFF system (Lindahl & Malik, 2001) and used to rate the degree of observed conflict, operationalized as overall negative affectivity between partners.

Positive dimensions of couple communication behavior included the following five codes: (a) affection; (b) understanding and validation; (c) collaboration; (d) interest in and seeking out partner's perspective; and (e) lightness. The first four codes were based on the SPAFF coding system (Gottman & Krokoff, 1989). Lightness, which was added as a new, exploratory code, aimed to capture the degree to which the discussion took place in a constructive, safe atmosphere: the willingness to take the topic and each other's responses

[9] As part of the first visit, blood samples were taken, the findings of which are presented elsewhere (Roels et al., 2021).

seriously while engaging in an open-minded, cheerful, playful, humorous and/or lighthearted communication.

Training of Observers

Five observers underwent training using observational data from past studies of couples' conflict communication, before behaviors of participants of the current study were coded. The training involved becoming familiar with the coding protocol, which included clear guidelines and instructions for the coding process as well as elaborate definitions of the coding constructs, including code attributes, dialogue examples and considerations. Each observer received approximately 8 hours of training.

Procedure for Observer Ratings

Each coding category was rated on a scale of 1 (*none*) to 10 (*a great deal*) after the coder had observed the entire couple interaction. Coders were instructed to pay attention to both verbal and nonverbal aspects of the behavior belonging to a specific category. Although each of these sources of information was considered important in their own right, the goal was to arrive at a rating that was based on the combination of information from verbal and nonverbal cues. If verbal and nonverbal messages appeared discrepant, nonverbal information took precedence over what exactly was being said. For example, the statement, "you offer great ideas" said in a sarcastic tone of voice would be considered an example of sarcasm, or contemptuous behavior.

Coding categories were not mutually exclusive; any behavior or reaction by a partner might be an exemplar of more than one category. The coder was trained to consider the degree to which the category in question was displayed. Coders took both the frequency and intensity of the behavior(s) into account, as well as the context in which they occurred. Each category was rated independently of other rating categories, such that a rating for one category would not add to or detract from the ratings of other categories.

Coder ratings applied to the discussion as a whole. Coders rated only one partner of each dyad (referred to as the "target partner") but were instructed to watch the couple interaction once to get an overall impression of the way in which the participants interact with each other. During this first viewing, coders paid attention to both individuals, not just the person they were assigned to code. At the end of the first viewing, coders were asked to provide a preliminary 3-point range for each code (low, medium, or high) for the target partner. Following this, coders watched the couple interaction a second time, focusing primarily on the partner they had been instructed to rate and looking again and in a more detailed manner for the behaviors outlined in the rating categories. After viewing the couple interaction for the

second time, they rated the target partner on all dimensions. Coders were offered the possibility to view the couple interaction for a third time if they were uncertain about any of their ratings.

Once the training was completed, coders were given weekly assignments that included a list of couple interactions assigned to them. In addition to the specific discussions that each coder was assigned, a subgroup of the discussions was rated by all coders and these data were used to calculate Inter-Rater Reliability. Couple interactions were randomized, yet precautions were made so that no observer would code both partners of the same discussion or both discussions of the same partner, to minimize bias and learning effects.

Inter-Rater Reliability

Inter-Rater Reliability was evaluated using two-way mixed, consistency, single-measures Intra-Class Correlation (ICC) (McGraw & Wong, 1996) to estimate the degree of consistency in coder ratings of the different codes across participants. Only codes for which the resulting ICCs were in the good or excellent range (ICC ≥ .60) (Cicchetti, 1994; Hallgren, 2012) were included in the analyses. In total 504 couple interactions were coded (126 couples x 2 partners x 2 discussions). Three trained coders each coded 112 discussions and two trained coders each coded 56 discussions. Additionally, a random selection of 56 discussions (11% of the total number of discussions) was coded by all five coders and was used to examine interrater reliability. The single-measure ICC scores for the 9 constructs ranged from .61 to .89, suggesting good overall reliability. Table 6.1. summarizes the specific single-measures and average-measures ICC scores of our included codes, with higher ICC values indicating greater Inter-Rater Reliability.[10]

[10] These and all other analyses were conducted using SPSS 25.0 (SPSS Inc., Chicago, IL, USA).

Table 6.1.

Intra-Class Correlation (ICC) Scores

Codes	Single-Measure ICC Score	Average-Measure ICC Score
Level of Conflict	.61	.89
Contemptuous Behaviors	.74	.93
Domineering & Belligerent Behaviors	.77	.94
Annoyance, Irritability, & Frustration	.72	.93
Affection	.62	.89
Understanding & Validation	.62	.89
Interest in & Seeking out Partner's Perspective	.65	.90
Lightness	.63	.60
Collaboration	.89	.88

Results

Factor Analysis of Communication Behaviors

A principal axis factor analysis (FA) with oblique rotation (direct oblimin) was conducted on the codes with ICC scores in the good or excellent range (Cicchetti, 1994; Hallgren, 2012). The Kaiser-Meyer-Olkin measure verified the sampling adequacy for the analysis, KMO= .82 ('meritorious'), and all KMO values for individual items were greater than 0.78, which is well above the acceptable limit of 0.50 (Kaiser, 1974). The factor analysis revealed three factors with eigenvalues above 1 which combined explained 74% of the variance. Factor extraction met Kaiser's criterion, with a sample size exceeding 250 and an average communality of above 0.60 (0.61), suggesting a three-factor solution. This was supported by visual inspection of the scree plot, which revealed an inflexion that also justified retaining three factors. Table 6.2. presents the correlations among the nine communication behaviors and between the communication behaviors and factor loadings after rotation.

The first factor represents Negative behaviors (level of conflict; contemptuous behaviors; domineering and belligerence; and annoyance and frustration). The second factor represents Affectionate behaviors (lightness; collaboration; and affection). The third factor represents Validating behaviors (understanding and validation; and interest in and seeking out partner's perspective). To test the consistency and robustness of this factor solution, we performed additional factor analyses, separately for men and women and for the two discussion topics, which all resulted in the same three factor structure. Internal consistency of

the three factors ranged from acceptable to good for both nonsexual discussions (Negative behaviors: $\alpha_{Women} = .88$, $\alpha_{Men} = .84$; Affectionate behaviors: $\alpha_{Women} = .79$, $\alpha_{Men} = .77$; Validating behaviors: $\alpha_{Women} = .76$, $\alpha_{Men} = .72$) and sexual discussions (Negative behaviors: $\alpha_{Women} = .87$, $\alpha_{Men} = .74$; Affectionate behaviors: $\alpha_{Women} = .78$, $\alpha_{Men} = .77$; Validating behaviors: $\alpha_{Women} = .71$, $\alpha_{Men} = .75$). Table 6.3. presents the correlations among the three factors and Tables 6.4. and 6.5. present descriptives and correlations between communication behaviors and relationship satisfaction.

Importance Of and Desired Change In Sexual and Nonsexual Topics

Men rated sexual topics as more important than nonsexual topics ($M = 7.77$, $SD = 1.37$ vs. $M = 7.08$, $SD = 2.02$; $t[125] = 3.52$, $p \leq .001$). No other differences in topic importance were found. Regarding self-reported desire for change, women desired more change in nonsexual than in sexual topics ($M = 1.30$, $SD = .99$ vs. $M = 1.02$, $SD = .95$; $t[125] = 2.70$, $p = .008$). No other differences were found. To explore the possible impact of topic importance and desired change, we reran the analyses presented below controlling for these two variables. Controlling for topic importance and desired change did not change the original pattern of results and testing moderation effects of topic importance and desired change yielded no significant interactions. Thus, we present the findings from the more parsimonious models that did not include topic importance and desired change as predictors.

Comparison of Communication Behaviors During Sexual and Nonsexual Discussions

Mixed-model ANOVAs, with gender (female/male) as between-subjects factor and discussion topic (nonsexual/sexual) as within-subjects factor, revealed significant main effects of discussion topic for all three communication behaviors (Negative behaviors: $F(1, 248) = 10.81$, $p < .001$, partial $\eta^2 = .069$; Affectionate behaviors: $F(1, 248) = 9.16$, $p < .005$, partial $\eta^2 = .031$; Validating behaviors: $F(1, 248) = 27.15$, $p < .001$, partial $\eta^2 = .049$; Greenhouse-Geisser corrected). On average, more negative behaviors were displayed during nonsexual discussions ($M = 1.71$, $SD = 1.21$) than during sexual discussions ($M = 1.41$, $SD = 0.87$). In addition, compared to nonsexual discussions, sexual discussions were characterized by higher levels of both affectionate (nonsexual: $M = 4.68$, $SD = 1.52$; sexual: $M = 4.95$, $SD = 1.45$) and validating (nonsexual: $M = 4.63$, $SD = 1.69$; sexual: $M = 5.10$, $SD = 1.65$) behaviors. In addition, a significant main effect for gender was found for negative behaviors ($F(1, 248) = 4.11$, $p < .05$). On average, women ($M = 1.67$, $SD = 1.27$) displayed more negative behaviors than men ($M =$

1.44, *SD* = 1.27) during the two discussions. No other significant main or interaction effects were found.

Associations Between Sexual and Nonsexual Communication Behaviors and Relationship Satisfaction

To test our second research question, we conducted a series of hierarchically structured, multilevel mixed-model analyses, with individuals nested within couples. This approach enabled us to account for the interdependence of couple data (Kenny et al., 2006). We tested our hypotheses using the APIM (Kashy & Kenny, 2000), which provides estimates for actor effects (the effect of Partner A's predictor variable on Partner A's outcome variable) as well as partner effects (effect of Partner A's predictor variable on Partner B's outcome variable).

Instead of estimating the effects of all communication behaviors across the two discussions in a single model, we ran separate APIM models for sexual and nonsexual discussions and the three communication behaviors, each including actor and partner effects. This approach was preferred given the sizeable correlations among the measures of communication, both within and across discussion topic (see Table 6.5.), and given our interest in estimating actor and partner effects for each communication behavior. The simultaneous estimation of all effects in a single model can lead to distortion of individual coefficients (York, 2018). The models differed in terms of the type of communication behavior that was used to predict relationship satisfaction, as well as the topic (sexual versus nonsexual) that was assessed.[11]

[11] We accounted for multiple testing using the Benjamini-Hochberg procedure, which decreases the false discovery rate (Benjamini & Hochberg, 1995). Using this procedure, all of the statistically significant values from our findings remained significant.

Table 6.2.

Zero-Order Correlations Between the Nine Coded Communication Behaviors and Factor Loadings after rotation for Coded Communication Variable

		1	2	3	4	5	6	7	8	Factor 1: Negative behaviors	Factor 2: Affectionate behaviors	Factor 3: Validating behaviors
1.	Level of conflict	-								.75	-.12	.03
2.	Contempt	.55*	-							.77	.07	-.05
3.	Domineering & Belligerence	.50*	.64*	-						.68	.04	-.11
4.	Annoyance & Frustration	.75*	.61*	.56*	-					.87	-.06	.10
5.	Lightness	-.46*	-.32*	-.35*	-.43*	-				-.13	.91	-.09
6.	Collaboration	-.51*	-.36*	-.38*	-.45*	.70*	-			-.20	.57	.24
7.	Affection	-.14*	-.17*	-.17*	-.15*	.52*	.43*	-		.08	.57	.06
8.	Understanding & Validation	-.32*	-.32*	-.35*	-.29*	.35*	.52*	.23*	-	-.09	-.04	.83
9.	Interest in & seeking out partner's perspective	-.23*	-.19*	-.22*	-.18*	.32*	.44*	.25*	.59*	.05	.08	.67

Note. $N = 252$, $^*p \leq .001$.

Table 6.3.

Factor Correlation Matrix for Communication Behaviors

	1	2	3
1. Negative behaviors	-		
2. Affectionate behaviors	-.43**	-	
3. Validating behaviors	-.39**	.49**	-

Note. $N = 252$. $^{**}p \leq .01$.

Table 6.4.

Descriptives and Cronbach Alphas for Communication Behaviors and Relationship Satisfaction

Variable	Gender	*M*	*SD*	α	Possible Range	Observed Range
Negative behaviors during nonsexual discussion	F	1.85	1.27	.88	1-10	1.00-6.25
	M	1.55	1.11	.84		1.00-8.00
Negative behaviors during sexual discussion	F	1.49	1.00	.87	1-10	1.00-6.25
	M	1.33	.72	.74		1.00-5.50
Affectionate behaviors during nonsexual discussion	F	4.68	1.61	.79	1-10	1.00-9.00
	M	4.68	1.43	.77		1.33-7.67
Affectionate behaviors during sexual discussion	F	4.86	1.44	.78	1-10	1.00-8.00
	M	5.03	1.46	.77		1.33-8.00
Validating behaviors during nonsexual discussion	F	4.63	1.80	.76	1-10	1.50-9.50
	M	4.67	1.60	.72		1.00-8.50
Validating behaviors during sexual discussion	F	4.91	1.58	.71	1-10	1.00-9.00
	M	5.28	1.70	.75		1.50-8.50
Relationship satisfaction	F	136.98	16.01	.94	0-161	72-160
	M	134.90	16.14	.94		82-159

Table 6.5.

Correlations Between Communication Behaviors, Relationship Satisfaction, and Sample Characteristics

Study variables	1	2	3	4	5	6	7	8	9	10
1. Negative behaviors during nonsexual discussion	**.46****	.45**	-.50**	-.38**	-.41**	-.20*	-.30**	-.16	.06	-.07
2. Negative behaviors during sexual discussion	.56**	**.56****	-.24**	-.46**	-.23**	-.31**	-.21*	-.18*	.20*	-.11
3. Affectionate behaviors during nonsexual discussion	-.44**	-.35**	**.51****	.52**	.56**	.12	.18*	.12	.03	.002
4. Affectionate behaviors during sexual discussion	-.41**	-.44**	.45**	**.45****	.34**	.36**	.25**	.03	.002	-.03
5. Validating behaviors during nonsexual discussion	-.33**	-.30**	.45**	.25**	**.08**	.27**	.16	.15	.10	.05
6. Validating behaviors during sexual discussion	-.24**	-.27**	.24**	.45**	.20*	**-.02**	-.03	.33**	.04	.14
7. Relationship satisfaction	-.15	-.40**	.17	.24**	.08	.15	**.49****	-.06	-.08	-.01
8. Age, years	-.04	-.03	-.08	.07	.07	-.05	.06	**.63****	.09	.30**
9. Relationship length, years	.004	.17	-.12	-.04	-.05	-.04	-.05	.13	**.98****	.30**
10. Cohabitation, years	.006	-.04	-.11	-.05	-.08	-.05	-.08	.20*	.08	**.64****

Note. Correlations for women appear above the diagonal; correlations for men appear below the diagonal. Correlations along the diagonal are between dyad members.

*$p \leq .05$, **$p \leq .01$.

All predictors were grand-mean centered prior to analyses, using the means across both partners (i.e., the sample mean of the specific covariate scores ignoring the distinguishable variable, in this case ignoring gender) (Kenny et al., 2006, p. 94). For each model, the deviance test for distinguishability was used to assess whether there are statistical differences as a function of the distinguishable variable of gender.[12] A significant deviance test indicates the dyad members should be treated as distinguishable, rejecting the null hypothesis of indistinguishability. If the deviance test is not significant, the data are consistent with the null hypothesis that the dyad members are indistinguishable, and gender does not affect the results.

We did not find any significant correlations between sample characteristics (age; relationship length; years of cohabitation) and our main outcome variable (relationship satisfaction; see Table 6.5). However, we did find significant correlations between some sample characteristics and communication behaviors in women during sexual discussions: age and negative behaviors were negatively (r = -.18, p = .04) correlated and age and positive behaviors were positively (r = .33, p < .001) correlated. Women's reported relationship length and negative behaviors during sexual discussions were also significantly correlated (r = .20, p = .03). In men, no significant correlations were found. Controlling for age and relationship length and testing their interactions with communication behaviors did not change the pattern of our APIM results. For this reason, the presented analyses do not include these two variables as covariates.

Negative Communication Behaviors

Table 6.6. shows the unstandardized and standardized regression coefficients for the actor and partner effects of negative communication behaviors on relationship satisfaction during the nonsexual (Model 1) and during the sexual discussion (Model 2). For the nonsexual discussion (Model 1), the deviance test for distinguishability was not significant (χ^2 (4) = 7.26, p = .12), suggesting that the observed pattern of results did not differ by gender. Hence, as gender did not meaningfully impact the model, gender moderations were not pursued. The analysis revealed significant actor and partner effects of negative behaviors. Specifically, negative behaviors during nonsexual discussions predicted lower relationship satisfaction in

[12] We tested for distinguishability as part of all APIM analyses, to allow us to assess whether the variable of interest (in this case, gender) indeed had an impact, instead of assuming such differences would exist. Not all previous studies on dyadic processes have tested for distinguishability in relation to gender and explored gender moderations regardless. The current approach has the advantage of evaluating actor/partner effects independently of gender, allowing for the test of interactions with gender, but not starting with assumptions about gender differences. Furthermore, testing for gender-related interaction effects in the absence of evidence for distinguishability increases the number of tests being carried out and the likelihood of spurious results.

oneself (β = -.16, t(248.83) = -2.57, p = .011) and in the partner (β = -.15, t(248.83) = -2.41, p = .017). Together, actor and partner effects accounted for 7% of the variance in relationship satisfaction.

As the deviance test for distinguishability was significant for the sexual discussion (χ^2 (4) = 9.97, p = .04), dyads were treated as distinguishable in this model (Model 2). Again, significant main actor and partner effects were found, with negative behaviors during the sexual discussion predicting both lower relationship satisfaction in oneself (β = -.21, t(243.71) = -3.28, p = .001) and in one's partner (β = -.14, t(243.71) = -2.16, p = .032). However, the two effects were qualified by gender (p = .008 and p = .038, respectively). As shown in Table 7, a two-intercept model to test the simple slopes for each level of the distinguishable variable (gender) revealed that actor effects were significant for men only. That is, men who engaged in greater negative communication when discussing sexual conflicts were more likely to report lower relationship satisfaction, but this association between negative communication behaviors and relationship satisfaction was not significant for women (men: β = -.50, t(123.00) = -4.12, p < .001; women: β = -.05, t(123.00) = -0.59, p = .56). The opposite was found for partner effects, which were only significant for women (β = -.32, t(123.00) = -2.56, p = .012), indicating that women whose partner expressed more negative behaviors during the sexual discussion were less satisfied in their relationship. In men, partner effects were not significant (β = .03, t(123.00) = -.36, p = .72). Actor and partner effects combined accounted for 9% of the variance in relationship satisfaction for women and 16% of the variance in relationship satisfaction for men.

Table 6.6.

APIM model demonstrating the effects of negative behaviors during the nonsexual (Model 1) and the sexual discussion (Model 2) to relationship satisfaction

Predictor	*b*	*SE*	β	*t*
Nonsexual discussions				
Actor Negative behaviors	-2.09**	.06	-.16**	-2.57
Partner Negative behaviors	-1.96*	.06	-.15*	-2.41
Sexual discussions				
– *Women*				
Actor Negative behaviors	-0.98	1.67	-.05	-0.59
Partner Negative behaviors	-5.97**	2.33	-.32**	-2.56
– *Men*				
Actor Negative behaviors	-9.27***	2.25	-.50***	-4.12
Partner Negative behaviors	.58	1.61	.03	0.36

Note. *b* = unstandardized regression coefficient, *SE* = standard error of unstandardized regression coefficient, β = standardized regression coefficient. *df* = 248.83 for Nonsexual discussions; *df* = 122.00 for Sexual discussions in women; *df* = 123.00 for Sexual discussions in men. *$p \leq .05$, **$p \leq .01$, ***$p \leq .001$.

Affectionate Communication Behaviors

Table 6.7. shows the unstandardized and standardized regression coefficients for the actor and partner effects of affectionate communication behaviors on relationship satisfaction during the nonsexual (Model 3) and during the sexual discussion (Model 4). For the nonsexual discussion (Model 3), the dyads were treated as indistinguishable (deviance test χ^2 (4) = 4.21, p = .38). The analysis revealed no significant actor effects (β = .08, t(248.34) = 1.27, p = .21); however, we did find significant partner effects (β = .18, t(248.34) = 2.95, p = .003), indicating that greater displays of affection by one's partner were associated with higher relationship satisfaction of the actor. Actor and partner effects combined accounted for 6% of the variance in relationship satisfaction.

For the sexual discussion (Model 4), dyads were also treated as indistinguishable (deviance test χ^2 (4) = 8.51, p = .07). The analysis revealed significant actor (β = .15, t(246.89) = 2.50, p = .013) and partner effects (β = .20, t(246.89) = 3.20, p = .002), indicating that participants who displayed greater affection during sexual discussions were more satisfied themselves and also had more satisfied partners. Actor and partner effects combined accounted for 8% of the variance in relationship satisfaction.

Table 6.7.

APIM model demonstrating the effects of affectionate behaviors during the nonsexual (Model 3) and the sexual discussion (Model 4) to relationship satisfaction

Predictor	***b***	***SE***	**β**	***t***
Nonsexual discussions				
Actor Affectionate behaviors	0.84	.66	.08	1.27
Partner Affectionate behaviors	1.96**	.66	.18**	2.95
Sexual discussions				
Actor Affectionate behaviors	1.69**	.68	.15**	2.50
Partner Affectionate behaviors	2.17**	.68	.20**	3.20

Note. b = unstandardized regression coefficient, *SE* = standard error of unstandardized regression coefficient, β = standardized regression coefficient. *df* = 248.34 for Nonsexual discussions; *df* = 246.89 for Sexual discussions. **$p \leq .01$.

Validating Communication Behaviors

Table 6.8. shows the unstandardized and standardized regression coefficients for the actor and partner effects of validating communication behaviors on relationship satisfaction during the nonsexual (Model 5) and during the sexual discussion (Model 6). For the nonsexual discussion (Model 5), dyads were treated as indistinguishable (deviance test χ^2 (4) = 3.62, p = .46). Similar to affectionate behaviors, we did not find significant actor effects for validating behaviors during this discussion (β = .11, t(214.46) = 1.75, p = .082). However, we did again find significant partner effects (β = .24, t(214.46) = 3.93, p < .001), indicating that partners of participants who displayed higher levels of validating behaviors during nonsexual discussions were more relationally satisfied. Actor and partner effects combined accounted for 7% of the variance in relationship satisfaction (χ^2 (2) = 15.16, p = .004).

For the sexual discussion (Model 6), dyads were again treated as indistinguishable (deviance test χ^2 (4) = 4.30, p = .37). Although for this discussion, too, no significant actor effects were found (β = .06, t(197.67) = .92, p = .36), there were significant partner effects (β = .17, t(197.67) = 2.74, p = .007). Actor and partner effects combined accounted for 3% of the variance in relationship satisfaction (χ^2 (2) = 7.75, p = .02).

Table 6.8.

APIM model demonstrating the effects of validating behaviors during the nonsexual (Model 5) and the sexual discussion (Model 6) to relationship satisfaction

Predictor	*b*	*SE*	β	*t*
Nonsexual discussions				
Actor Validating behaviors	1.00	.57	.11	1.75
Partner Validating behaviors	2.24***	.57	.24***	3.93
Sexual discussions				
Actor Validating behaviors	0.56	.61	.06	.92
Partner Validating behaviors	1.68**	.61	.17**	2.74

Note. *b* = unstandardized regression coefficient, *SE* = standard error of unstandardized regression coefficient, β = standardized regression coefficient. *df* = 214.46 for Nonsexual discussions; *df* = 197.67 for Sexual discussions. **$p \leq .01$, ***$p \leq .001$.

Discussion

The current study used observational methods to examine how couples in the early stages of their relationship discuss sexual and nonsexual conflicts in their relationship, and how communication behaviors during these discussions are associated with relationship satisfaction. Factor analysis revealed three factors of couple communication behaviors: negative behaviors, affectionate behaviors, and validating behaviors. These factors map closely to couples communication behaviors investigated in past observational studies. Similar to what our data showed, Heyman and colleagues (2020) found that the specific negative codes they investigated tended to converge on a single negative factor. Similarly, Rehman and colleagues (2011) found that the negative codes of belligerence, domineering, and contempt tended to hang together. Regarding the two positive categories (affection and validation), our results contradict some past work that has tended to find that different positive behaviors load to a single positive factor (e.g., Heyman et al., 2020), but is consistent with other theoretical and empirical work that distinguishes affection and validation (McNeil et al., 2018). The code of validation is theoretically linked to partner responsiveness, a construct that has been extensively discussed in the broader literature on couples functioning (e.g., Reis, 2012), and has been applied specifically to couples sexual relationships (Birnbaum et al., 2016). The affection code is conceptually closely associated with positive affect and can be viewed as a form of partner-focused positive affect. There is extensive literature demonstrating that greater displays of positive affect are associated with higher relationship satisfaction (see review by Ramsey & Gentzler, 2015).

The first goal of the current study was to examine whether communication behaviors differ between sexual and nonsexual conflict discussions. Consistent with our predictions, couples exhibited more negative behaviors during nonsexual discussions and more positive (affectionate and validating) behaviors during sexual discussions. These results replicate and extend past research that found that sexual communication, as compared to nonsexual communication, is characterized by greater levels of warmth and friendliness (Rehman et al., 2017). Whereas Rehman and colleagues (2017) did not find a significant difference in mean levels of dominance across the two discussions, the current study included a wider range of negative behaviors (e.g., contempt, belligerence, frustration) and found that both partners displayed more negative behaviors during nonsexual discussions as compared to sexual discussions.

Why might couples behave in ways that indicate an overall softening of communication when discussing sexual conflicts in their relationship? One potential explanation for higher positivity and lower negativity during sexual conflict discussions involves the possibility that this behavioral pattern reflects romantic partners' effort to manage higher perceived threat associated with sexual, as compared to nonsexual communication (e.g., Jones et al., 2018;

Mark & Jozkowski, 2013). That is, in an effort to manage greater perceived threat, partners may change their behaviors, potentially as a way to signal safety. These findings are consistent with shifts in behavior reported by Rehman and colleagues (2017) and show that they play a role in both more experienced and younger samples. That is, Rehman and colleagues' (2017) sample consisted of couples in long-term relationships whose average relationship length was more than 10 years and, on average, the participants were in their late thirties. The current sample consisted of adults in their early twenties and in the early stages of their relationship, and the findings show that these younger couples also change their communication behaviors across the two types of discussions, suggesting that this difference may already exist or emerge in early relationship phases. To better understand how and when these differences between sexual and nonsexual communication emerge, future studies could examine couples communication during different stages of relationship formation; it is possible, for example, that partners' approach to sexual communication reflects a general caution and avoidance of such communication that is long-standing and reflects cultural and familiar factors, rather than a phenomenon that develops within and is specific to romantic relationships.

It could be argued that shifts in behavior across discussions are adaptive, as couples are exercising more caution in a situation they fear has greater potential to harm the relationship. After all, the sexual relationship of couples is, at least in part, dependent on or influenced by processes, such as desirability and attractiveness, that are highly personal and sensitive in nature, and sexual communication may reveal core relational vulnerabilities or incompatibilities, possibly threatening the sustainability of the relationship. From this perspective, differences in behavior between sexual and nonsexual topic discussions would suggest a flexible, adaptive response to situational demands. However, it is also possible that such shifts are the result of the suppression of affective behavioral responses during sexual communication. For example, partners may not feel that they can express their feelings of shame or embarrassment related to their sexual relationship, and in this case, behavioral shifts may not be adaptive. Further research is needed to shed light on these two competing hypotheses about whether shifts in behavior across sexual and nonsexual discussions represent an adaptive process or one that may prove deleterious to a couple's sexual well-being in the long run.

Our second research goal was to examine how and to what degree observed communication in sexual and nonsexual conflict discussions is associated with relationship satisfaction. Past theoretical work has consistently emphasized the importance of communication to relational outcomes (Byers, 2011; Frederick et al., 2017; Jones et al., 2018; Mark & Jozkowski, 2013; Montesi et al., 2010), but to our knowledge, there has been only one study that examined the association between observed sexual and nonsexual communication behaviors and relationship satisfaction (Rehman et al., 2011). In the current study, negative

communication behaviors during nonsexual conflict discussions were associated with lower relationship satisfaction in oneself and in one's partner. The deviance test for distinguishability was not significant in this model, indicating that the tested associations did not differ by gender. For sexual discussions, on the other hand, the effects were qualified by gender; men's negative behaviors, but not women's negative behaviors, were associated with lower relationship quality in themselves and their partners.

It is worth noting that, even though men (and women) expressed significantly less negativity during the sexual, as compared to the nonsexual discussion, and even though, overall, women expressed more negative behaviors than men during the two discussions, men's expressions of negativity during the sexual discussion predicted a greater amount of variance in their relationship quality (16%) than their negativity during nonsexual discussions (7%). This pattern of results, with men's degree of negative behavior being lower during the sexual discussions but having higher predictive value, seems to point to the sexual domain being more relevant to specifically men's relationship quality. For women, the expression of negativity during the sexual discussion was associated with neither their own nor their partner's relationship satisfaction. In the current study, we do not have sufficient information to explain this gender difference. However, our results suggest that although men, in general, do not behave more negatively than women during sexual conflict discussions, differences exist in how observed sexual communication behaviors are related to self-evaluated relational well-being.

Future research could explore to what degree the gender differences we observed in our study may be explained by demand-withdraw interaction patterns (Christensen & Heavey, 1990). This extensively studied pattern represents a dynamic where one partner demands change from the other and the other disengages through various avoidance behaviors, particularly withdrawal. Christensen and Heavey (1990) found a greater likelihood of a woman-demand/man-withdraw pattern in marital conflict, yet we should allow for the possibility that this pattern is typically found during general conflict discussions, and that the reverse (man-demand/woman-withdraw) can occur during sexual discussions. This is consistent with notions derived from sexual economics theory, which describes sex as a female resource in heterosexual interactions, with men generally being more demanding in negotiations about whether to have sex (Baumeister & Vohs, 2004). Related to this, studies have examined whether previously observed differences in demand-withdraw patterns are specific to gender or to which partner is desiring change in the relationship, with women more likely to be in the demanding role because the relationship status quo may, in general, be less favorable for them. Holley, Strum, and Levenson (2010), for example, found that the demand-withdraw interaction pattern also occurred in same-sex couples, leading the authors to challenge the notion that the pattern reflects basic differences between men and women.

Our factor analyses clustered positive behaviors in two different categories, affectionate and validating behaviors, and both were associated with relationship satisfaction. Though the direction of the association between positive communication behaviors and relationship satisfaction was suggested by prior observational research on sexual communication (Rehman et al., 2011), our study is the first to find significant effects of positive communication behaviors on relationship satisfaction during *both* discussions. Additionally, we found differences in actor and partner effects, which have not been tested previously. In our sample, observed affectionate behaviors were positively associated with one's own relationship satisfaction (actor effects) during sexual discussions, yet this effect did not reach significance in nonsexual discussions. In both discussions, however, partner effects were significant, with men's and women's affectionate and validating behaviors predicting greater relationship satisfaction in their partners.

The significant partner effects – found for both types of positive behaviors and in both types of conflict discussions – suggest that one partner's overt expression of positivity may be relationally protective in the context of conflict discussions and may serve the function of creating safety for the other partner. In a similar vein, it may signal that even though there is a disagreement, the relational bond is not being threatened. We found no gender differences in these associations, indicating that for both women and men, positive behaviors in one's partner were associated with a positive evaluation of one's relationship. However, due to the correlational nature of our findings, we should allow for the possibility that more satisfied couples engage in more positive behavior during couple conflict discussions. The described partner effects underscore the importance of considering both partners in the analyses, a key notion to the study of dyadic data (Kenny et al., 2006). Additionally, the absence of gender differences is in line with previous questionnaire-based (Davis et al., 2006; Timm & Keiley, 2011) and observational research (Rehman et al., 2011).

Future Directions

The findings indicate that partners behaved differently during the two types of dicussions. Our sample consisted of partners who scored generally high on relationship satisfaction and it is not clear whether similar shifts in behavior across conflict discussions would be found in couples who experience relationship distress. Such a comparison could yield information about how partners' ability to display flexibility may change as a relationship becomes more emotionally challenging or impoverished.

Secondly, our methodology does not allow for any conclusions on whether the observed changes in behaviors across the two discussions were intentional or occurred automatically and without conscious awareness. Future studies could have couples, at the end of the experimental session, answer questions about their own behaviors or watch and rate the

recorded sexual and nonsexual couple discussions. This would allow them to provide their own assessments and interpretations of their behaviors, and of possible shifts in those behaviors across discussion topics. Based on earlier research on attributional models and the applications of such models to intimate relationships (Bradbury & Fincham, 1990), personal interpretations of behavioral shifts across sexual and nonsexual topics may improve our understanding of how romantic couples construe sexual and nonsexual conflicts and how such construals are linked to relationship satisfaction. If partners are not aware of independently chronicled changes in behavior across discussions, this finding would be consistent with past research on implicit relational dynamics, indicating that processes outside of our conscious awareness can exert influences on our behavior (McNulty et al., 2013).

Further, research on the topic of couple communication might benefit from a stronger focus on contextual factors that shape whether a particular communication strategy or approach exerts positive or negative influences on a relationship (Overall & McNulty, 2017). For example, for problems that are rated as severe but that are believed to be solvable, more direct, negative communication may result in decreases in the problem behavior. In contrast, the opposite strategy of indirect positive behavior can be useful to reduce defensiveness in the partner. The study of sexual communication may benefit from the application of this perspective, as it introduces an additional dimension that could be used to evaluate communication behaviors: the degree of directness in couple communication. In future work, it may be worthwhile to investigate whether evaluating sexual communication along both the dimension of valence (positive/negative) and that of directness may provide us with a more nuanced understanding of what type of communication strategies may be more or less useful in helping couples resolve sexual conflicts in their relationship, as compared to the dimension of valence alone.

Finally, since our study focused on conflict communication, it would be interesting to investigate if the results would differ with other types of sexual communication (e.g., discussions of sexual likes and dislikes, or discussion of use of sex toys, role-playing, safe-sex practices). As suggested by Graber and colleagues (2011), the inclusion of positive couple interaction tasks in the observational study of communication holds both scientific and therapeutic promise, and, to our knowledge, this territory has remained relatively unexplored in observational studies of sexual communication.

The findings of the current study are based on data collected from a community sample of couples characterized by high levels of relationship satisfaction. As a result, we cannot generalize these findings to couples who are more distressed or who are receiving sexual or couple therapy. However, the observational methods we used in the current study also have the potential to yield important information about how distressed couples navigate, or fail to navigate, sexual and nonsexual conflicts. To our knowledge, although sexuality-related

problems are among the most commonly cited reasons for couples to seek therapy (Doss et al., 2004; Peplau, 2003), no research as yet has examined how distressed couples discuss sexual conflicts in their relationship.

Strengths and Limitations

The current study is one of only three to use observational methods to assess the interpersonal dynamics of sexual and nonsexual communication (Rehman et al., 2011; Rehman et al., 2017). The majority of past work on this topic has relied on self-report to assess both communication and satisfaction, which can, due to common-method variance, inflate associations between the two (Orth, 2013). In the current study, we used a combination of observational and self-report methods to assess communication and satisfaction, and our observational methodology, which captures the characteristics of how couples communicate *in vivo,* avoids the reliance on self-insight and the ability and willingness to assess and report on one's own communication patterns (Gottman & Krokoff, 1989). The dyadic nature of our study and its analyses provided us the opportunity to investigate how one partner's behavior influences the other's outcomes. Through this dyadic approach, we believe we can develop a more comprehensive understanding of the ways in which partners influence and are influenced by each other. Furthermore, with our well-powered study and our detailed analysis of communication behaviors, we built on and expanded prior studies that relied on a small sample size (Rehman et al., 2011) or did not examine associations with relationship satisfaction (Rehman et al., 2017).

The majority of observational studies on couple communication focuses on how couples discuss conflict topics, with little attention to specific conflict areas (R.E. Heyman, 2001; Rehman et al., 2017). Williamson and colleagues (2013) described how the topic of conflict, after controlling for problem severity and relationship satisfaction, can be associated with both partners' communication behaviors. Our results show that conflict topic, at least when it comes to the comparison of sexual and nonsexual ones, exerts different effects on behaviors. In future studies, researchers could examine in more detail how different characteristics of the discussion topics (e.g., which partner wants the most change, and in what direction, and what specific changes are desired) influence the observed patterns of results.

One limitation of the current study is that communication behaviors were assessed globally, by evaluating the discussion as a whole. Although this is not an uncommon approach in observational studies on sexual and nonsexual communication (McNeil et al., 2018; Rehman et al., 2011), future studies could look at the temporal characteristics of sexual communication in more detail and investigate whether not only discrete, specific communication behaviors but also (interactive) patterns of communication, are more likely to occur during sexual communication, as compared to during discussions of other topic areas.

For example, negative reciprocity is a communication pattern that involves an interactional sequence where one partner's negativity follows the other (Cordova et al., 1993). The findings of the current study suggest the possibility that couples may be less likely to engage in negative reciprocity when discussing sexual conflicts.

Second, our coding system did not explicitly distinguish between verbal and nonverbal cues, and therefore we are not able to say which behavioral modality most contributed to the found effects. Although nonverbal information took precedence over what exactly was being said, a more thorough examination of these different cues might yield additional insights with clinical relevance.

Third, although the observational study of sexual and nonsexual communication offers unique benefits to the study of couple communication, it is important to note that this approach requires extensive training and is labor intensive, which may raise the threshold for its application in specific settings (e.g., clinical research). As mentioned above, the appropriate methodology for assessing communication depends on the specific questions examined (Noller & Feeney, 2003), and using both methods (observational and self-report) together could be a valuable addition to the literature as it would not only allow for a direct comparison of these two data sources but also possibly give insights neither method would be able to provide on its own (McNeil et al., 2018). Due to the lack of existing Dutch versions, the translated questionnaires used in this study, despite being well-validated in their original form and showing excellent internal consistency in the current study, could benefit from additional validation and further psychometric analysis.

Although we found significant associations between communication behaviors and relationship satisfaction, our study design does not allow us to make judgements about causal direction and, for example, whether or not improving communication behaviors would result in greater relationship satisfaction. Another consideration involves the homogeneity of our sample, which consisted of mixed-sex couples and mostly white men and women. Although the homogeneity of our sample minimized the influence of variables outside the scope of our current research (e.g., relationship duration, presence of children, sexual disorders), future avenues could include or compare clinically distressed couples or more diverse samples, in terms of ethnicity and education as well as relationship duration and sexual orientation. We acknowledge the limitations and shortcomings associated with excluding sexual minority couples from social science and sexuality research (DeLamater & Hyde, 2004; Thorne et al., 2019). We believe the methodological approach used in the current study could be equally informative and valuable in studies on sexual and nonsexual communication in same-sex couples and other (e.g., polyamorous) relationship contexts. Furthermore, a growing body of scientific work is describing the effects of contextual factors, such as socioeconomic status (Karney, 2021), and stress (Nguyen et al., 2020), on relationship dynamics, including couple

communication patterns. Future studies could explore if the sexual and nonsexual communication behaviors observed in our study sample, have the same qualities and effects in different cultures, populations, or contexts.

Due to concerns of multicollinearity and the possibility of suppression effects, we did not include both discussions in one model. Although our first research aim was to explore differences in observed communication behaviors, by comparing sexual and nonsexual discussions, our second research aim was to examine the association between communication behaviors during both discussions and relationship satisfaction, rather than test differences in such associations. Our statistical approach is similar to that applied in previous studies on general communication and sexual communication, which also tested associations with relational outcome variables using separate models (Byers & MacNeil, 1997; Mark & Jozkowski, 2013; McNeil et al., 2018; Rehman et al., 2011). A recent questionnaire study (Jones et al., 2018), compared the effects of both sets of variables in the same model, and found evidence supporting the idea that the two types of communication are separate and distinct, with different effects. Additionally, the choice to test different models in our study is supported by our test of distinguishability, which differed for the sexual and nonsexual discussions, indicating a different impact of gender in those analyses.

Conclusion

In this study, we compared observed communication behaviors of couples discussing sexual and nonsexual conflicts in their relationship and explored the contribution of these behaviors to relationship satisfaction. We found that communication behaviors differed between the two discussion topics. More specifically, sexual discussions were associated with less negative and more positive (affectionate and validating) behaviors. Furthermore, expressions of positivity were associated with greater relationship satisfaction in both types of conflict discussions. However, for negative behaviors, the findings were qualified by gender, such that only men's negative behaviors during sexual discussions were associated with lower relationship quality in themselves and in their partners. Our findings suggest that romantic partners soften their communication when discussing sexual conflicts, specifically, and this adjustment may be a way for them to adapt to the potentially higher perceived threat of sexual communication. Further, the pattern of gender differences in the association between negative behaviors and relationship satisfaction when discussing sexual conflicts, suggests that the sexual domain may have greater relevance for men's relationship satisfaction, a finding that would have to be replicated in longitudinal research.

SUPPLEMENTARY MATERIALS

APPENDIX A - OVERVIEW OF DISCUSSION TOPICS

Table 1

Overview of Topic Selection and Exclusion for the Nonsexual Discussions Topics

I want my partner to...	Times selected (*N* = 126)	Times vetoed by a partner
... participate in decisions about spending money.	4 (3%)	7
... spend time keeping the house clean.	10 (8%)	3
... have meals ready on time.	2 (2%)	3
... pay attention to his/her appearance.	3 (2%)	5
... get together with my friends.	5 (4%)	8
... pay the bills on time.	3 (2%)	6
... prepare interesting meals.	1 (1%)	4
... start interesting conversations with me.	6 (5%)	1
... go out with me.	4 (3%)	3
... show appreciation for the things I do well.	5 (4%)	3
... get together with my relatives.	3 (2%)	4
... drink.	3 (2%)	6
... work late.	2 (2%)	5
... get together with friends.	2 (2%)	6
... help with housework when asked.	1 (1%)	2
... argue with me.	6 (5%)	7
... spend time in outside activities.	2 (1%)	3
... give me attention when I need it.	2 (1%)	4
... assume responsibility for finances.	3 (2%)	8
... leave me time to myself.	4 (3%)	5
... agree to do things I like when we go out together.	1 (1%)	2
... accept praise.	6 (5%)	5
... accomplish his/her responsibilities promptly.	1 (1%)	4
... help in planning our free time.	12 (10%)	3
... express his/her emotions clearly.	24 (19%)	3
... spend time with me.	7 (6%)	2
... come to meals on time.	1 (1%)	5
... have nonsexual relationships with men/women.	3 (2%)	8

Table 2

Overview of Topic Selection and Exclusion for the Sexual Discussions Topics

I want my partner to…	Times selected (*N* = 126)	Times vetoed by a partner
… pay attention to my sexual needs.	6 (5%)	1
… have sexual relations with me.	5 (4%)	3
… engage in extramarital sexual relations.	1 (1%)	6
… be experimental in our sex life.	3 (2%)	4
… show interest in having sex with me.	12 (10%)	2
… be comfortable talking about sex with me.	5 (4%)	0
… be comfortable with his/her body during sex.	25 (20%)	0
… initiate sex with me.	20 (16%)	4
… be passionate during sex.	9 (7%)	0
… pay attention to foreplay.	6 (5%)	1
… be gentle after our sexual activity.	8 (6%)	0
… be open to experiment with sex toys.	1 (1%)	11
… focus on my orgasm.	3 (2%)	9
… climax soon.	8 (6%)	9
… agree with me on our sexual activity.	0	0
… use contraceptives (e.g., hormonal, condom).	2 (1%)	0
… masturbate.	4 (3%)	9
… watch porn.	2 (2%)	10
… watch porn with me.	2 (2%)	10
… make him/herself sexy for me (e.g., lingerie).	4 (3%)	3

APPENDIX B - COUPLE CODING PROTOCOL

Introduction

This coding system consists of a dimensional rating system that includes negative and positive codes. Each category is rated on a scale of 1 (*none*) to 10 (*a great deal*) after the coder has observed the entire couple interaction. Coders should use the following guidelines when making a rating for categories:

1----------2----------3----------4----------5----------6----------7----------8----------9----------10

None *A great deal*

- A rating of 1 on a category indicates that the behavior in question never occurred.
- A rating of 2-4 indicates that the target showed low levels of any behaviors included in that particular category.
- A rating of 5-7 on a category indicates that the target engaged in a moderate demonstration of the behaviors rated under that particular category.
- A rating of 8-10 on a category indicates that the target engaged in multiple instances or strongly demonstrated the behaviors rated for that particular category.

Background

The system that was used to code the observational data was based, in part, on the Specific Affect Coding System (SPAFF) (Gottman & Krokoff, 1989) and the System for Coding Interactions and Family Functioning (SCIFF) (Lindahl & Malik, 2001).

Introduced by Gottman & Krokoff (1989), the SPAFF differs from other observation systems because it focuses on the entirety of personal communication. This means that it pays attention to what is said in substance but also to intonation, context, facial expressions, gestures and body language. It is subdivided into 5 negative affects namely: anger, contempt/minority, sadness, fear, nagging. In addition, there are 5 positive affects such as affection, humor, interest, anticipation and excitement or joy (Coan & Gottman, 2007; Gottman & Krokoff, 1989).

The SCIFF was originally designed to code family problem discussions but has since been used to successfully code diverse family interactions, including family-level triadic codes, as well as dyadic and individual codes (Lindahl & Malik, 2001). It aims to capture the richness of interactions without resorting to a microanalytic level or a series of individual or dyadic codes only. Verbal and nonverbal elements of communication are incorporated in the codes of the SCIFF.

In addition to codes that were adapted from these coding systems, we included two new codes, related to annoyance: irritability and frustration (1), and lightness (2).

Coding Process

Before starting with the ratings, coders should watch the entire couple interaction once to get an overall impression of the way in which the participants interact with each other. During this first viewing, coders should pay attention to both individuals, not just the person they are assigned to code. Coders should note examples of codes in the margins to assist with final ratings. At the end of the first viewing, coders should identify a 3-point range for each code, for the target participant. This will help the coders to start to think about where the target partner falls on each of the codes (low-medium-high).

Then, coders should watch the couple interaction a second time, focusing primarily on the communicator they have been instructed to rate and looking for the behaviors outlined in the rating categories. After watching the couple interaction for the second time, they should rate the target participant in all categories. Coders should re-watch the couple interaction a third time if they are uncertain about any of their ratings.

Guidelines for Ratings

- Coders should pay attention to both verbal and nonverbal aspects of the behavior belonging to a specific category. Although both of these channels are important on their own, the goal is to come to a rating that is based on the combination of information from verbal and nonverbal cues.
- If the verbal and nonverbal messages are discrepant, the nonverbal channel takes precedence over the verbal channel. For example, the statement, “You offer great ideas.” said in a sarcastic tone of voice would be considered high negative affect.
- The categories are not mutually exclusive; any behavior or reaction by a partner might be an exemplar of more than one category. In making the ratings, the coder should consider the degree to which the category in question is displayed. Coders should take the frequency and intensity of the behavior(s) into account, as well as the context in which they occur.
- Each category should be rated independently of other rating categories, such that a rating for one category would not add to or detract from the ratings of other categories.
- Only one partner should be coded at one time.

Notes to Coders

- If, while viewing the tape, you miss or do not understand what occurs during a particular segment, you should immediately stop the video and replay that segment.
- Take notes or make notations in the margins to provide information when giving values for ratings. This is especially useful for training purposes and to establish why there may be low reliability between coders, if this occurs.
- Categories do not need to be coded in the order presented on the coding sheet, but every category must be coded.
- If you are unsure about a rating on any category, watch the couple interaction a third time.
- Sometimes coders shy away from using the extremes and they scale down, but this could reduce reliability, so don't be afraid of coding extremes.

Overview[13]

Negative dimensions: Contemptuous Behaviors (1)*;* Domineering and Belligerent Behaviors (2)*;* Annoyance, Irritability, Frustration (3)*;* Overall Level of Conflict (4).
Positive dimensions: Affection (1)*;* Understanding and Validation (2)*;* Collaboration (3)*;* Interest In and Seeking Out Partner's Perspective (4)*;* Lightness (5).

[13] Only codes with Intra-Class Correlation (ICC) scores in the good or excellent range (ICC ≥ .60) are included in this coding manual, as only these codes were included in the analyses. The descriptions and definitions of these codes are based on the original source material, verbatim (see: Coan & Gottman, 2007, or Lindahl & Malik, 2001).

Negative Dimensions

1. Contemptuous Behaviors

This code was based, in part, on the Specific Affect Coding System (SPAFF) (Coan & Gottman, 2007; Gottman & Krokoff, 1989) and is described as the attempt to insult or otherwise communicate a lack of respect toward one's partner. Contempt is different than a simple disagreement. There is a distance with contempt, an icy quality with a suggestion of superiority as if looking down one's nose at one's partner.

Examples of Contemptuous Behaviors:

- Sarcasm – Derisive laughter or a ridiculing comment regarding something the subject's partner has said. Can be comments as short as "Sure!" or "I'll bet you did!" when the meaning of the statement is obviously the reverse of its words.
- Mockery/Vocal Repeat – Repeating something that one's partner has said with an exaggeration intended to show a lack of respect for the statement or the individual to whom the statement is attributed.
- Insults – An active communication of disrespect for one's partner through verbal cruelty. It is intended to humiliate the partner with the suggestions that the partner is foolish, incompetent, ugly or otherwise without virtue (e.g., "I guess your boss didn't mind hiring an ugly person.").
- Name Calling.
- Eye Rolls – Always, as long as it is directed that the partner.

Dialogue Examples:

- A: "It's hard work to take care of the kids all day." B: "Sure it is." (Sarcasm)
- A: "Can't you just help me in the kitchen once?" B: (High pitched, exaggerated voice tone) "Can't you just help me once?!" (Mockery)
- A: "Why can't you just talk to me for a while when you get home from work?" B: "I don't talk to you because you're so boring. I'd rather just read the paper." (Insults)
- A: "You are a liar./ You are a thief." (Insults)

Considerations:

- Contempt has to be specifically targeted towards the partner.
- This does not include contempt expressed at someone other than the partner, unless it is clear that the contempt at the other is even an indirect putdown of the partner (e.g., "Yeah, your mother did a great job raising you." - said in a sarcastic tone of voice).

2. Domineering and Belligerent Behaviors

Also based on the SPAFF (Coan & Gottman, 2007; Gottman & Krokoff, 1989), the goal of domineering behavior is to dominate the other person in no uncertain terms. Domineering individuals will try to control the conversation. These individuals are trying to force compliance, to get the other person to withdraw, retreat, or submit to their own views. Usually there will be little emotion in the voice compared to contempt; the voice is controlled. Dominant interactions include participants who voice their standards as the standard and behave as being the authority.

Belligerence is provocative. The belligerent person disagrees with or contests whatever his/her partner is saying, seemingly regardless of content. This person appears to be provoking a response in his/her partner, as if trying to start a fight. He/she may present his/her partner with a challenge or appear to delight in his/her partner's discomfort.

Attributes:

- Invalidation – The partner actively denies the validity of previously expressed feelings of their partner. Note that invalidation is not the absence of validation, but rather the presence of a statement that says, in effect, "You are wrong." ex. "Bull shit!".
- Lecturing – Picture a mother shaking her finger at a son who has run off to a friend's house without asking permission. He/She will be telling her/him as a figure of authority that she/he was wrong, why he/she is right, and lay down the rules. In domineering people, look for platitudes, clichés and quotes from authorities or the ambiguous "everyone" (as in "everyone knows") to support their point of view. Lecturing also includes talking over the partner in an attempt to actively control or dominate the conversation.
- Patronizing – Lecturing in a distinctly patronizing quality, as if doing one's best to talk patiently to a child.
- Glowering – This is a steady gaze. The person's head may be down, like a cobra about to strike, or the individual may be leaning forward. The horns are down; finger pointing is almost always coded domineering also. Person is leaning forward with chin down. Is a non-verbal communication that the other person should stop talking; like a threat.

Examples of Belligerent Behaviors:

- Taunting questions – Questions that serve only to confuse and irritate one's partner for one's amusement. The belligerent person may be struggling to repress a smile as he asks these questions while his spouse becomes enraged.

- The dare – Here the belligerent person attempts to test the agreed limits or fundamental rules of the relationship. It is likewise daring one's spouse to keep the rules from being broken. Questions like "So?" and "What would you do if I did?" and "What are you going to do about it?" fall into this category.

Dialogue Examples:

- A: "I'm sorry, I didn't realize traffic would be so bad."

B: "How many times do I have to tell you? (Head forward; Speech slow and deliberate) Rush hour starts at four and often lasts until six thirty or seven. During rush hour, it is nearly impossible to drive to your mother's and back within a half-hour. Now, if you'll pay attention more to what I tell you, we'll be able to avoid problems like this in the future." (Patronizing/Lecturing)

- A: "I'm really serious about this!" B: (Stifling a smirk) "Are you sure you're *really* serious about this?" (Taunting question)
- A: "I don't like the way you kept putting your arm around him. It seemed like you were flirting with him." B: "What if I was?" (The dare)

3. Annoyance, Irritability, and Frustration

This category captures the degree to which the target partner demonstrates negative affect targeted toward his/her partner of low-level negative affect, such as annoyance, irritability, and frustration. This category will frequently involve a negative voice tone and negative content.

Dialogue Examples:

- "You're always forgetting things." (Re-direct, somewhat negative, annoyed voice tone)
- "Why can't you just be a bit more understanding?" (In a negative tone, frustrated)
- "I just don't get why it always has to be me taking the initiative." (Frustration)

Considerations:

- Bear in mind that we are specifically looking for annoyance or frustration towards partner here. Do not score high on this category if the participant is specifically showing annoyance or frustration that is related to the context (e.g., the study).

4. Overall Level of Conflict

This code is based on the System for Coding Interactions and Family Functioning (SCIFF) system (Lindahl & Malik, 2001). On a scale from 1 to 10, rate the degree of conflict in the discussion. This includes explicit forms of negative affect such as anger and hostility, as well as more subtle forms such as impatience or abruptness. Since a couple can disagree, but have no conflict, and vice versa, we are specifically interested in the level of conflict (i.e., a dispute, quarrel). Please score partners individually on this code.

Positive Dimensions

1. Affection

Based on the SPAFF coding system (Coan & Gottman, 2007; Gottman & Krokoff, 1989), this category captures expressions of love, caring, support, and nurturance toward the partner. The voice tone for this category will be soft and warm and the content will indicate kindness. Body language may include smiling, leaning forward.

Dialogue Examples:

- "I love you." said in a warm, loving tone.
- Verbal expression of adoration (e.g., "I adore you.", "You mean so much to me.", "Where would I be without you?").
- Nonverbal expressions of adoration (e.g., gazing lovingly at partner, blowing a kiss at the partner).

2. Understanding and Validation

This code, also based on the SPAFF (Coan & Gottman, 2007; Gottman & Krokoff, 1989) and captures the extent to which the target partner expresses understanding and acceptance of his/her partner's views, feelings and behaviors. Note that the target does not have to agree with their partner's perspective, but shows respect for their suggestions. The target listens to his/her partner with an open mind and positive attitude. The target may paraphrase partner's statements.

Attributes:

- Nonverbal Validation – this indicates the individual is listening to the partner in an affirmative fashion by using paralinguistic cues, such as head nods, "umm-hmms", or other physical/vocal assenting behaviors. Note that to code a behavior as validation, there must be eye contact or it must be very clear that the target is looking at the other person when engaging in the behavior(s). Watch out for meaningless head nods.
- Understanding/Acceptance – this includes direct expressions of understanding and/or acceptance of the partner's point of view. It also includes explicit expressions of respect or agreement.
- Paraphrasing – the target repeats back what the other person has just said in a slightly different style or even word-for-word.
- Finishing sentences – the target places an ending to the sentence the other person has begun; this is a way to let the partner know the individual is "on the same page" and can

follow the partner's train of thought. Note that you should not code interruptions under this category. To be coded as validation, finishing sentences should come with relatively positive affect and should communicate understanding.

Physical Cues: Head nod with eye contact.

Requirements: There should be a communication of respect – the target is open to suggestions and acknowledges that the other person makes sense. The tone of voice should be either neutral or positive. Eye contact is not necessary for verbal cues but is required for non-verbal cues.

Dialogue Examples:

- A: "I'm just finding it really hard to make new friends here." B**:** "Yeah, I can see how it could be hard." (Understanding, acceptance)
- A: "I just feel so afraid that if you get that motorcycle, you'll get killed in some accident." B: "Wow. It sounds like it really scares you." (Understanding, acceptance)
- A: "And so when you got pissed off and slammed the door, it really scared me!" B: "I bet! I'm really sorry about that!" (Apology)
- A: "We need to work harder at spending time together." B: "I know." (Neutral voice tone, acceptance)

Considerations:

Do not code validation for information exchange, such as answering a yes/no question.

3. Collaboration

Similarly based on the SPAFF coding system (Coan & Gottman, 2007; Gottman & Krokoff, 1989), this code captures statements suggesting that both partners value teamwork, approach things as a team, that they can rely on one another, be ready to work on things together regardless of what might be needed to happen or change, or a "we can take on the world and/or any problem together" orientation.

4. Interest In and Seeking Out Partner's Perspective

Based on the SPAFF coding system (Coan & Gottman, 2007; Gottman & Krokoff, 1989), this code indicates the extent to which the target partner expresses interest in the partner's thoughts, feelings, and his/her perspective. The target partner may solicit this directly through questions or might make statements to indicate their interest in hearing the partner's

perspective. This category also includes behaviors by target partner where he/she takes active steps to clarify the other partner's perspective (e.g., "What I hear you saying is..." or "Do you mean...?" or "So you feel hurt when I do that?"). This category also includes encouraging the partner to share his/her perspective. Note that depending on context, nodding and silence (giving space) could be coded under this category. However, since these nonverbal cues can be scored under other categories in a different context (e.g., validation, avoidance), it is best to look for more explicit (e.g., verbal) cues when in doubt.

Dialogue Examples:

- "What makes you feel that way?"
- "I wonder what you think about this issue."
- "Are there other things [other than sex toys] that interest you?"

5. Lightness

This category reflects the degree to which the conversation is, overall, easy-going. Lightness is characterized by a comfortable and safe atmosphere; a willingness to take the topic and each other's responses seriously, combined with an open-minded, joyous, playful, humorous and/or lighthearted communication. Lightness has to have a constructive quality to score high on this category.

CHAPTER SEVEN

THE LINK BETWEEN OXYTOCIN PLASMA LEVELS AND OBSERVED COMMUNICATION BEHAVIORS DURING SEXUAL AND NONSEXUAL COUPLE DISCUSSIONS: AN EXPLORATORY STUDY

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ABSTRACT

The role of oxytocin (OT) in close relationships is complex, as both positive and negative associations have been found between OT and relationship processes. Also, with most research focusing on the effects of exogenous OT administration on communication and couple behaviors, our knowledge about the association between endogenous OT and couple dynamics remains limited. This study is the first to assess the link between peripheral OT levels and observed communication behaviors during sexual and nonsexual conflict discussions in romantic relationships. A sample of 126 young, heterosexual couples (Mean age = 23.3, SD = 2.4; average relationship duration = 1.9 years, SD = 0.9) participated in videotaped sexual and nonsexual couple conflict discussions of 7 minutes each. Communication behaviors were coded using an adaptation of the SPAFF and the SCIFF. Blood samples were collected prior to the couple discussions, during a separate lab visit, and OT plasma levels were determined using ELISA. Plasma OT levels were positively associated with validating behaviors during sexual discussions in both women (r = +.24, p = .008) and men (r = +.18, p = .052). No significant associations were found between OT levels and validating behaviors during nonsexual discussions and between OT and affectionate and negative behaviors during either sexual or nonsexual discussions. Analyses revealed significant associations between OT levels and one's own validating behaviors during sexual discussions (b = 47.82, t(201.16) = 3.81, p < .001) and one's partner's (b = 32.12, t(216.35) = 2.62, p = .009). The results highlight the biobehavioral aspects of couples' sexual communication and may contribute to a better understanding of the processes involved in individual and relational well-being. This study is the first to report an association between peripheral OT levels and validating behaviors during sexual communication, indicating neurophysiological involvement in dyadic sexual communication patterns.

Keywords. Oxytocin, sexual communication, couples.

Introduction

Relationship conflict and distress negatively impact physiological functioning and health and are risk factors for depression (Proulx et al., 2007). Although the literature on the association between relationship satisfaction and physical and mental health continues to grow (Fincham et al., 2018), the physiological and neuroendocrine mechanisms underlying such associations are still not fully understood (Schneiderman et al., 2014). Oxytocin (OT)'s role in the promotion of prosocial and affiliative behaviors has increasingly gained attention (Carter, 1992, 1998; Carter, 2014; Crockford et al., 2014). The current study aims to further our understanding of OT in romantic relationships and is the first to assess the link between peripheral OT levels and observed communication behaviors during sexual and nonsexual conflict discussions in a sample of young, heterosexual couples.

Oxytocin and Romantic Relationships

OT is involved in a wide range of relational, reproductive, and sexual processes (Veening et al., 2015). In the context of romantic relationships, studies have pointed at OT's role in relationship formation (Carter, 1998), prosocial and affiliative behavior (Carter, 2014), orgasm (Carter, 1992) and trust, support, and threat reduction (Crockford et al., 2014). Neural correlates of the capacity for the formation of romantic attachment have been associated with OT receptors (Carter et al., 2020) and bidirectional influences have been found between physiological, including hormonal, and behavioral processes in romantic partners (Schneiderman et al., 2014). Additionally, evidence is emerging for the importance of OT pathways in the adaptive consequences and benefits of human attachment formation (Carter, 2017b). OT levels are higher in partnered individuals during the early stages of romantic attachment, suggesting an important role of OT during these first stages of couple formation (Schneiderman et al., 2012). Although factors modulating the association between relationship quality and plasma OT remain unclear (T. W. Smith et al., 2013), evidence implicates OT's pivotal role in social behavior (Gouin et al., 2010), including couple interactions (Algoe et al., 2017; Schneiderman et al., 2014).

Oxytocin and Couple Interactions

Most research on OT involves the measurement of endogenous levels in individuals (Ebner et al., 2019; Plasencia et al., 2019) or the administration of exogenous OT and assessment of its effects on couple communication and dynamics (Jarnecke et al., 2018). In comparison, research on endogenous OT, measured peripherally in saliva or blood, and couple processes and interaction behaviors is limited. Nevertheless, peripheral levels of OT have been

associated with positive communication behaviors, affiliation, and social support in romantic relationships (Gouin et al., 2010; Light et al., 2005; Schneiderman et al., 2012). Moreover, a link has been found between levels of naturally occurring OT and subjective psychological responses to expressed gratitude of one's partner, implying OT's role in promoting bonds between human adult romantic partners and its ability to serve as 'rose-colored glasses' (Algoe et al., 2017). Others, however, have reported a link between OT and post-conflict anxiety as well as reduced forgiveness (Tabak et al., 2011). These contrasting findings illustrate the complexity of OT and contrast the ubiquitous 'love story' to which OT is often reduced, with authors stressing that consideration of context is important (Bartz et al., 2011). Indeed, OT seems to be associated with different and potentially contrasting effects, depending on situational and individual-based factors (Bartz et al., 2011).

Sexual Communication

In the study of the effects of romantic relationships on health and well-being, couple interaction and communication processes are considered of central importance (Kiecolt-Glaser et al., 2010; Robles et al., 2014). Supportive behaviors have stress-relieving qualities (Holt-Lunstad et al., 2008), whereas hostile behaviors have been associated with increased blood pressure and altered endocrine and immune functioning (Broadwell & Light, 1999; Kiecolt-Glaser et al., 1997). More generally, positive and negative communication behaviors are differentially associated with relationship quality and outcomes in longitudinal research (Gottman & Krokoff, 1989).

Although the scope of studies examining the role of OT in romantic relationships and couple communication processes is expanding (Algoe et al., 2017), most studies rely on self-report measures of sexual communication and, to date, no studies have examined association between OT and observed sexual communication. Defined as the process of discussing sexual preferences and sharing and responding to requests of change in the sexual relationship (Simon & Gagnon, 1986), sexual communication has been a focus of empirical research for many years with studies highlighting its unique contribution to sexual and overall relationship satisfaction (Frederick et al., 2017; Montesi et al., 2010). In light of past work, it can be argued that in romantic relationships, nonsexual and sexual communication provide unique contributions to promoting couple's relational well-being (Mark & Jozkowski, 2013; Rehman et al., 2011; Rehman et al., 2017).

The Current Study

The goal of the current study was to investigate OT's associations with communication behaviors during both sexual and nonsexual couple discussions. Consistent with the notion

that OT plays a role in pair bonding and romantic attachment, we focused on the initial stages of romantic relationships in young, heterosexual couples. Using hormonal, observational, and questionnaire-based methodologies, we assessed characteristics of both partners. Consistent with previous findings, we expected to find an association between peripheral OT and prosocial communication behaviors between partners. Based on the intimate nature of sexual communication and its association with greater displays of interpersonal warmth compared to nonsexual communication (Rehman et al., 2017), we tentatively predicted stronger associations between OT levels and communication behaviors during sexual discussions.

Methods

Participants

The sample consisted of 126 heterosexual couples ($N = 252$) who are part of an ongoing longitudinal study. Data were taken from the first wave of data collection. The study was advertised using posters and flyers, and advertisements were placed online (e.g., Facebook) and in local newspapers. The following inclusion criteria were used: (a) between ages 18 to 30 years; (b) in a committed, heterosexual relationship for at most three years; (c) cohabitating, or spending at least four nights a week together, for no more than two years; (d) able to speak and read Dutch. Individuals were excluded if they had cohabited or been married before, if they had children or were pregnant, and if they were being treated for sexual dysfunctions. All study measures and procedures were reviewed and approved by the university's research ethics board.

Questionnaires

Demographics and Sexual History Questionnaire (DSHQ) (Janssen et al., 2013). This questionnaire covers general demographic characteristics (e.g., age, income, education), relationship and sexual variables (e.g., relationship duration, previous partner), and general physical and mental health.

Areas of Change Questionnaire (ACQ) (Margolin et al., 1983). The ACQ was used to determine topics for the two conflict discussions (sexual and nonsexual). On a 7-point Likert-type scale ranging from 1 (*much more*) to 7 (*much less*), with 4 representing no desired change, participants were asked to rate how much they would like their spouses to change in various areas (e.g., expressing emotions; meeting up with friends or family). Responses were recoded such that higher numbers represent greater desired change. Similar to a prior pilot study (Rehman et al., 2011), we modified the ACQ to include a total of nine sexual topics (e.g., pay more/less attention to one's sexual needs, show more/less interest in sex, be more/less

experimental). In addition, a question was added to assess the importance of each topic to the participant on a scale from 1 (*not at all*) to 10 (*very important*), as well as another question which asked participants to indicate whether or not they would feel comfortable discussing this topic in our study.

Oxytocin Assays

After written informed consent was obtained during a first lab visit, blood was drawn from the antecubital vein of participants into pre-chilled 6mL vacutainer tubes containing ethylenediaminetetraacetic acid (EDTA), spray-died to the walls of the tube (K2). Per participant, two tubes were taken and inverted five times. They were immediately kept ice-chilled before being centrifuged at 4°C at 1000 x g for 15 min at the Rega Institute for Medical Research, KU Leuven (Belgium). Blood plasma was aliquoted and stored at -70°C.

Plasma aliquots were shipped on dry ice to The Kinsey Institute Resource Center at Indiana University (USA) for analysis. Samples were thawed at room temperature immediately before the assays. Plasma OT was measured using an enzyme-linked immunosorbent assay (ELISA) kit purchased from Enzo Life Sciences, Inc. (Farmingdale, New York), according to the manufacturer's instructions. This approach is consistent with previous research (Ebner et al., 2019; Plasencia et al., 2019). The plasma was diluted in assay buffer (at a ratio of 1:8 for the OT assay) to give results reliably within the linear portion of the standard curve. The ELISA kit has been reported by the manufacturer to be highly sensitive (minimal detection rate = 15.6 picogram per milliliter (pg/ml) for OT) with very little antibody cross-reactivity for other neuropeptides. All samples were run at once and the inter- and intra-assay coefficients of variation were less than 7.7 and 8.4 respectively.

In the present study, as in earlier research from our group, unextracted samples were used for analysis. Whether extracted or non-extracted samples lead to different results or whether extracted samples may hamper results has been extensively discussed in a recent study by MacLean and colleagues (2019). McCullough et al. (2013) suggested a single approach should be adopted as the standard in the field, arguing that valid levels of OT can only be determined in unextracted samples. However, as reviewed in MacLean et al. (2019), and as indicated by studies using other methods including mass spectrometry, it is premature to accept any single approach as a gold standard.

Discrepancies between methods are not necessarily an indicator that "some methods are valid whereas others are not". In fact, McCullough et al.'s (2013) conclusions regarding the usefulness in predicting behavior based on blood levels of OT taken from unextracted samples are contradicted by more recent research. For example, two recent studies show that unextracted samples are more likely to show associations with behavior (Chu et al., 2020; Saxbe et al., 2019). Our experience with assays in unextracted plasma indicates reliable and

replicable relationships between peripheral measures of OT and behavior, even in analyses done several years apart (see for example, Lancaster et al., 2015).

Sexual and Nonsexual Couple Communication[14]

During a second lab visit,[15] couples were asked to engage in a sexual and a nonsexual conflict discussion, each lasting 7 minutes. The topics were presented in counterbalanced order. Topic selection for the sexual and nonsexual discussions was based on both partners' individual responses to the ACQ (described above). The researchers compared both partners' responses and selected the topics that scored highest on (discrepancy in) desired change and on topic importance. The researchers consulted with each partner individually, and if one or both partners were reluctant to discuss the selected topic, the topic with the second highest rating was offered as an alternative. After topic selection, both partners were re-united in the observation room, where wall-mounted video cameras captured the couple interactions.

Observational data were coded using two previously developed coding systems: the Specific Affect Coding System (SPAFF) (Gottman & Krokoff, 1989) and the System for Coding Interactions and Family Functioning (SCIFF) (Lindahl & Malik, 2001). In addition to the codes that were adapted from these coding systems, we included two new codes, one related to annoyance, irritability, or frustration, and one related to lightness, resulting in a total of four negative and five positive codes. The four negative dimensions were: (a) contemptuous behaviors; (b) domineering and belligerent behaviors; (c) annoyance, irritability, and frustration; and (d) overall level of conflict. The five positive dimensions were: (a) affection; (b) understanding and validation; (c) collaboration; (d) interest in and seeking out partner's perspective; and (e) lightness.

Five observers underwent training using observational data from past studies of couples' conflict communication, before behaviors of participants of the current study were coded. Each coding category was rated on a scale of 1 (*none*) to 10 (*a great deal*) after the coder had observed the entire interaction. Coders were instructed to pay attention to both verbal and nonverbal aspects of the behavior belonging to a specific category. A total of 504 interactions were coded (126 couples x 2 partners x 2 discussions). A random selection of 56 discussions (11% of total number of discussions) was coded by all five coders and was used to examine interrater reliability. The single-measure ICC scores for the 9 codes ranged from .61 to .89, suggesting good overall interrater reliability (Cicchetti, 1994).

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[14] The data from the present study were obtained as part of a larger project examining the affective and behavioral characteristics of sexuality in romantic relationships. For more detailed information on the procedures and the coding of the conflict discussions, see Chapter Six.

[15] Average time between first and second lab visit was 16 days (M = 16.02, SD = 23.50).

Statistical Analysis

All analyses were conducted using SPSS 25.0 (SPSS Inc., Chicago, IL, USA). An exploratory factor analysis was used to examine the factor structure of our coded communication behavior variables. Differences between women and men in plasma OT was tested with t-tests and Pearson's correlations examined associations between OT and couple communication behaviors during sexual and nonsexual discussions. We utilized the Actor-Partner Interdependence Model (APIM) (Kenny et al., 2006) to test the statistical effects of both partners' communication behaviors on OT levels, controlling for dyadic data dependency.

Results

Sample Characteristics

See Chapter Three: Dataset and General Procedure. Also, most (96%) of women used some kind of hormonal contraceptives (63% oral contraceptives; 24% intrauterine device; 9% vaginal ring), and the mean number of days since their last menstrual cycle was 12.75 (*SD* = 8.75). No associations were found between the time since last menstrual cycle and any of the hormonal and behavioral variables. In our study, no associations were found between the time since last menstrual cycle and any of the hormonal and behavioral variables.

Factor Analysis of Communication Behaviors

A principal axis factor analysis (FA) with oblique rotation (direct oblimin) was conducted on the 9 codes that had high or excellent ICCs. Three factors had eigenvalues over Kaiser's criterion of 1 and in combination explained 74% of the variance. This was supported by visual inspection of the scree plot, which revealed an inflexion that also justified retaining three factors. Factor 1 represents Negative behaviors (level of conflict; contemptuous behaviors; domineering and belligerence; and annoyance and frustration), Factor 2 represents Affectionate behaviors (lightness; collaboration; and affection), and Factor 3 represents Validating behaviors (understanding and validation; and interest in and seeking out partner's perspective). To test the consistency and robustness of this factor solution, we performed additional factor analyses, separately for men and women and for the two discussion topics, which all resulted in the same three factor structure. Internal consistency of the three factors ranged from acceptable to good for both nonsexual discussions (Negative behaviors: α_{Women} = .88, α_{Men} = .84; Affectionate behaviors: α_{Women} = .79, α_{Men} = .77; Validating behaviors: α_{Women} = .76, α_{Men} = .72) and sexual discussions (Negative behaviors: α_{Women} = .87, α_{Men} = .74; Affectionate behaviors: α_{Women} = .78, α_{Men} = .77; Validating behaviors: α_{Women} = .71, α_{Men} = .75).

Oxytocin and Communication Behaviors

Plasma OT levels are presented in Table 7.1. OT levels were significantly higher in women than in men, $t(125) = 11.21$, $p < .001$. During nonsexual discussions, women expressed more negative behaviors than men ($t(124) = 2.69$, $p = .008$). No significant differences between men and women were found for affectionate ($t(125) = -.020$, $p = .984$) and validating behaviors ($t(125) = -.21$, $p = .832$) during nonsexual discussions. During sexual discussions, women also expressed significantly more negative behaviors ($t(124) = 2.10$, $p = .038$). Again, no significant differences were found for affectionate ($t(124) = -1.28$, $p = .203$) and validating behaviors ($t(124) = -1.80$, $p = .075$). For both women and men, OT levels were significantly correlated with validating behaviors during sexual discussions (see Table 7.2.). Visual inspection of the scatterplots (Figure 7.1.) suggests that the correlations between OT levels and validating behaviors during sexual discussions could have been affected by outliers. A total of four (three female and one male) multivariate outliers were identified using the computation of Mahalanobis Distances ($p < .001$). Correlations between OT levels and validating behaviors during sexual discussion, after excluding these subjects, were $r = +.24$, $p = .008$, in women, and $r = +.18$, $p = .052$, in men. We found no significant correlations between plasma OT levels and validating behaviors during nonsexual discussions. Also, no significant correlations were found between OT and negative behaviors and OT and affectionate behaviors during either sexual or nonsexual discussions.

To make full use of the dyadic nature of our data, we explored the associations between OT and validating communication behaviors during sexual discussions using APIM (Kenny et al., 2006).[16] APIM provides estimates for both actor effects (the effect Partner A's predictor variable on Partner A's outcome variable) and partner effects (effect of a Partner A's predictor variable on Partner B's outcome variable) and is widely implemented for dealing with interdependence between couple members. We found a significant positive correlation between both partners' OT levels ($r = .27$, $p = .003$), indicating nonindependence of the data, providing further support for the use of APIM.

[16] The four outliers described above were excluded from all further analyses.

Table 7.1.

Descriptives for Predictor and Outcome Variables

Variable	*Gender*	*M*	*SD*	*α*	*t*	Range Potential	Range Actual
Oxytocin (pg/mL)	F	1514.48	394.19	-	11.21**	-	787.90 - 2819.00
	M	1094.06	282.17				487.00 - 2488.00
Negative behaviors during nonsexual discussion	F	1.85	1.27	.88	2.69**	1-10	1.00-6.25
	M	1.55	1.11	.84			1.00-8.00
Negative behaviors during sexual discussion	F	1.49	1.00	.87	2.10*	1-10	1.00-6.25
	M	1.33	.72	.74			1.00-5.50
Affectionate behaviors during nonsexual discussion	F	4.68	1.61	.79	-.02	1-10	1.00-9.00
	M	4.68	1.43	.77			1.33-7.67
Affectionate behaviors during sexual discussion	F	4.86	1.44	.78	-1.28	1-10	1.00-8.00
	M	5.03	1.46	.77			1.33-8.00
Validating behaviors during nonsexual discussion	F	4.63	1.80	.76	-.21	1-10	1.50-9.50
	M	4.67	1.60	.72			1.00-8.50
Validating behaviors during sexual discussion	F	4.91	1.58	.71	-1.80	1-10	1.00-9.00
	M	5.28	1.70	.75			1.50-8.50

*$p \leq .05$, **$p \leq .01$.

Table 7.2.

Correlations Between Predictor and Outcome Variables

Study variables	1	2	3	4	5	6	7
1. Oxytocin	**.26****	.01	.07	-.05	-.05	.05	.18*
2. Negative behaviors during nonsexual discussion	-.09	**.46****	.45**	-.50**	-.38**	-.41**	-.20*
3. Negative behaviors during sexual discussion	-.10	.56**	**.56****	-.24**	-.46**	-.23**	-.31**
4. Affectionate behaviors during nonsexual discussion	.08	-.44**	-.35**	**.51****	.52**	.56**	.12
5. Affectionate behaviors during sexual discussion	-.06	-.41**	-.44**	.45**	**.45****	.34**	.36**
6. Validating behaviors during nonsexual discussion	.10	-.33**	-.30**	.45**	.25**	**.08**	.27**
7. Validating behaviors during sexual discussion	.19*	-.24**	-.27**	.24**	.45**	.20*	**-.02**

Note. Correlations for women appear above the diagonal; correlations for men appear below the diagonal. Correlations along the diagonals are between dyad members.

*$p \leq .05$, **$p \leq .01$.

Table 7.3.

APIM Parameter Estimates for Oxytocin levels

Predictor	*b*	*SE*	*β*	*t*
Actor Validating behaviors during Sexual discussions	47.82***	12.54	.20***	3.81
Partner Validating behaviors during Sexual discussions	32.12**	12.24	.13**	2.62

Note. *b* = unstandardized regression coefficient, *SE* = standard error of unstandardized regression coefficient, beta= standardized regression coefficient. *df* = 201.16 for actor effects and *df* = 216.35 for partner effects. **$p \leq .01$, ***$p \leq .001$.

We tested an APIM model in which validating communication behavior during sexual discussions was included as predictor and OT as outcome variable. The APIM model had good model fit (χ^2 (4) = 98.29, p < .001) and the deviance test for distinguishability was significant (p < .001), indicating that we should conduct analyses separately based on self-reported gender/sex. The results revealed significant main actor effects for both women and men (see Table 7.3.), indicating that women and men who expressed more validating behaviors during sexual discussions had higher plasma OT levels. Similarly, our results revealed significant partner effects, meaning higher levels of validating behaviors were associated with higher levels of OT in one's partner.[17] We did find a significant difference in mean OT levels for women and men, while controlling for validating behaviors during sexual discussions, with women having higher levels of plasma OT than men. We did not find significant interactions with gender, meaning there were no significant differences for actor or partner effects between women and men in our sample.[18]

Discussion

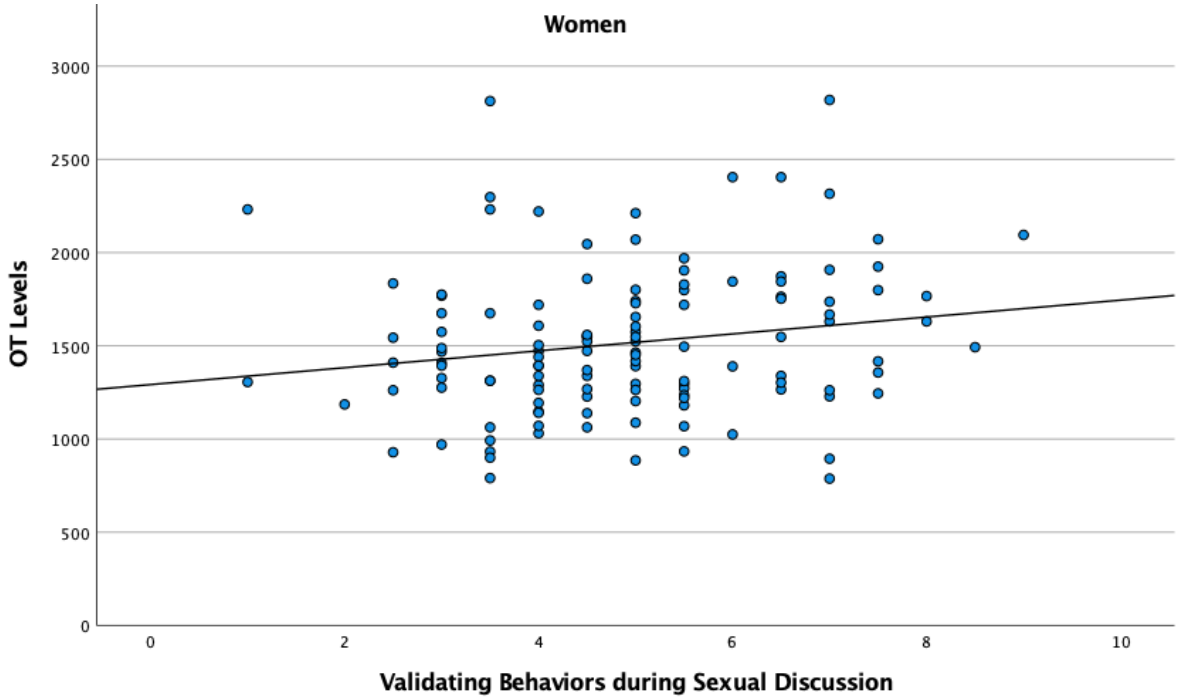
Plasma OT levels were significantly and positively associated with validating behaviors during sexual discussions in both women and men. We did not find such an association for nonsexual discussions, nor did we find any association between OT and affective and negative communication behaviors, during either sexual or nonsexual discussions. Previous studies found behaviors such as affectionate touch and interpersonal focus to be associated with OT levels in romantic partners, pointing at the possibility of a bio-behavioral feedback loop, whereby higher levels of reciprocity and touch may increase involvement in the relationship at physiological, behavioral, and representational levels (Schneiderman et al., 2012). Consistent with Feldman's (2012) bio-behavioral synchrony model, we found associations between partners' hormones and behavior, in that both the individual's and the partner's OT levels were associated with validating behaviors. According to the bio-behavioral synchrony model, bond formation is characterized by neurohormonal and behavioral attunement between partners as well as by mutual influences between the physiology of one

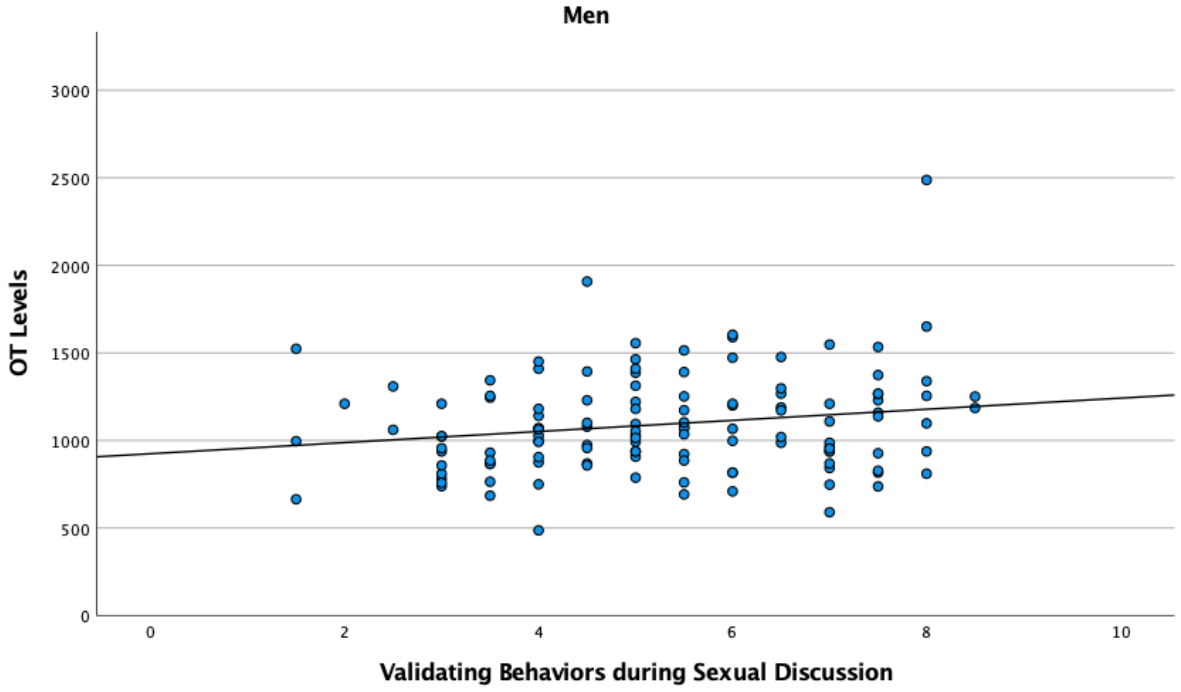
[17] Rerunning the analyses, while controlling for relationship duration, did not change the pattern of results: No significant main (b = -15.31, t(119.69) = -.64, p = .521) or interaction effects (relationship duration x validating behaviors) were found for the sexual discussions (Actor: b = -7.86, t(223.13) = -.55, p = .586; Partner: b = -40.12, t(210.33) = -2.82, p = .067).

[18] To explore the possible impact of time between blood sampling and observational task on these findings, we reran the analyses controlling for the time between the two lab visits. The covariate was grand-mean centered prior to analyses, using means across both partners. Controlling for time did not change the pattern of results. For this reason, we present findings from the more parsimonious models that did not include time as a covariate.

Figure 7.1.

Scatterplots for the Correlation Between Oxytocin Levels and Validating Behaviors During Sexual Discussions in Women and Men





partner and the behavior of the other. In our sample, we found higher OT levels in women and men who exhibit more validating behaviors during sexual discussions themselves (actor effects) or whose partners exhibit more validating behaviors during these discussions (partner effects).

These findings indicate that the effects of neurohormonal processes on bonding are not limited to the level of the individual but are also impacted by the partner's behavior. This is in line with findings by Schneiderman et al. (2014), who expressed the value of moving beyond the individual and to include the dyad as the unit of analysis for a "fuller biobehavioral matrix" focusing on all possible interactions between hormones and behavior. Though hormones can shape relational behavior, the reverse should be considered as well, with relational behaviors potentially shaping hormone levels. Additionally, research suggests that OT can facilitate the transformation of anxiety and avoidance into approach and positive emotional states (Carter, 1998). As couples tend to report higher levels of anxiety before sexual conflict discussions (Rehman et al., 2017) and sexual topics generally tend to be avoided (Peplau, 2003), our findings are consistent with the possibility that OT may be part of a process that helps transform avoidance and associated behaviors into active engagement and communication with one's partner, in which validation may serve as a particularly effective form of approach behavior.

In our study, women had significantly higher plasma OT levels than men. This is consistent with findings of Plasencia and colleagues (2019), but in contrast with Weisman et al. (2013) who found higher plasma OT levels in men than in women. These differences may possibly be explained by differences in sample composition. While both previous studies focused on individuals rather than couples, Weisman et al. (2013) also included women who were breastfeeding at the time of the study. Interestingly, we used a similar assay kit to that used by Plasencia et al. (2019), which differed from Weisman et al. (2013), who used a OT-ELISA kit by Assay-Design (MI, USA).

As described in the methods section, ELISA kits purchased from Enzo Life Sciences, Inc. (Farmingdale, New York) were used to measure plasma OT levels, and, noteworthily, we found high levels of plasma OT in our sample. The present study was based on the version of the Enzo Life Sciences kits available in 2019. This kit yields levels of OT that are much higher than those seen previously using an assay system from Enzo Life Sciences. Unfortunately, the earlier Enzo Life Sciences kit and its antibodies are no longer available for comparison. However, in another ongoing study, using unextracted samples, and comparing between the currently available Enzo Life Sciences kit and an assay kit from Arbor Assays (Ann Arbor, MI) we also obtained much higher levels of OT with the Enzo Life Sciences kit. It should be noted that the relationship between behavior and plasma OT was stronger in data from studies yielding higher levels of OT, as is the case in Chu, et al., (2020) and Saxbe, et al., (2019).

Studies using enzyme-based (or radio-immunoassays) different assay methods routinely give different values. The sources of this variation remain poorly understood, and might be due to extraction (which discards significant amounts of OT from plasma) (MacLean, et al., 2019), but also may be due to differences in the antibodies in these kits. Quantitative comparisons across studies using different assay kits and antibodies are not recommended, and in our experience within-study associations between plasma OT and behavior are often significant regardless of the procedures employed (extraction or not, or different assay kits).

However, different antibodies used in these assays are only one of several possible sources of between-study variation (MacLean et al., 2019). Consistent with animal studies (Cho et al., 1999), higher levels of OT at the beginning of romantic relationships suggest its involvement in processes of partner attachment in humans, and substantially higher plasma levels of OT have been found in couples compared to non-attached singles (Schneiderman et al., 2014). Additionally, though some findings report stability of structural aspects of OT-expressing neurons (e.g., number and size) over time (Ishunina & Swaab, 1999), previous research has also found that central OT release decreases with age (Plasencia et al., 2019).

We did not find significant correlations between OT levels and affectionate behaviors during sexual or nonsexual discussions. Previous research has found associations between OT and positive couple behaviors, including relationship-enhancing attribution (Gouin et al., 2010), partner hugs (Light et al., 2005), and interactive reciprocity (Schneiderman et al., 2012). Considering our factor 'affectionate behaviors' represented a combination of affection, collaboration, and lightness, it could be that this dimension reflects a more generally positive ambience and conversation context between the two partners, rather than more specific, individual expressions or communication behaviors. Consistent with this interpretation, the dimension of validating behaviors consisted of codes capturing more active expressions and communication behaviors. For example, the code 'interested in and seeking out partner perspective' captured the extent to which a partner expressed interest in the other partner's thoughts, feelings, and his/her perspective. Similarly, 'understanding and validation' captured expressions of understanding and acceptance of one's partner's views, feelings, and behaviors. These constructs seem to more closely resemble OT's behavioral effects as reflecting "the capacity to be close to and sensitive to others" (Carter, 2014).

Additionally, Gouin et al.'s (2010) code for positive communication behaviors involved an aggregation of behaviors, such as acceptance and relationship-enhancing attribution, that come closer to validating than affectionate behaviors as operationalized in our study. A similar observation can be made about Schneiderman et al.'s (2012) construct of interactive reciprocity, which included codes close to our construct of validating behaviors (e.g., dyadic reciprocity, interpersonal focus, and matching of emotional state). Hence, we believe our

findings are consistent with those of previous studies, and point to the usefulness of fine-grained view regarding which *positive behaviors* can be of interest in the study of OT.

We did not find any associations between OT levels and communication behaviors observed during nonsexual conflict discussions. This seems to be in contrast with previous research (Schneiderman et al., 2014), in which it was found that individuals whose partners had higher OT showed greater empathy during conflict discussion. No actor effects for OT were found in this study but, perhaps more importantly, the authors used a conflict interaction paradigm in which no distinction is made between sexual and nonsexual areas of disagreement (Gottman, 1979). In a similar fashion, our results may contradict other findings (Schneiderman et al., 2012), showing a link between OT and couples' interactive reciprocity. However, in the present study couples were asked to engage in conflict discussions, rather than discuss a shared positive experience.

Overall, our results indicate that OT levels are specifically associated with validating behaviors expressed during sexual discussions. Past empirical and theoretical work has consistently emphasized the importance and unique contribution of sexual communication to relational outcomes (Frederick et al., 2017; Mark & Jozkowski, 2013; Montesi et al., 2010; Rehman et al., 2011). It could be argued that sexual issues touch upon aspects of the self and the relationship that are particularly sensitive and salient, an observation that is consistent with clinical observations and reflected in couples' therapy, where intimacy and sexuality-related concerns and problems are among the most prevalent (Peplau, 2003). Since this study was not based on a clinical sample, speculation about implications for clinical practice should be done with restraint. However, our results hint at the potential qualities and relevance of the neurophysiological dimensions of sexual communication, which could be explored further and in more depth in future research, which could include clinical samples.

Strengths and Limitations

Although the number and scope of studies examining the role of OT in couple interactions is increasing (Algoe et al., 2017; T. W. Smith et al., 2013), and although OT is gaining ground as subject of study in the areas of human sexuality and reproductive behavior (Veening et al., 2015), studies have not directly examined the association of OT with sexual communication. Additionally, the study of sexual communication using observational measures remains greatly underrepresented in the literature, with the vast majority of studies relying on self-report measures. Another strength of the current study is that we recruited both members of a dyad, which gave us the opportunity to investigate how one partner's behavior influences the other's outcomes. Through this dyadic approach, we believe we can develop a more comprehensive understanding of the ways in which partners influence and are

influenced by each other. The specificity of the association between OT levels and sexual communication found in the current study is intriguing and points to the need for additional research that replicates this finding and extends it by investigating which aspects of sexual communication influence OT levels. Specifying the biobehavioral processes underpinning romantic attachment may illuminate the contribution of such relationships to both individual and relational well-being.

Several limitations of our study should be considered as well. First, as is common in human research, we did not measure OT at the central level but in the periphery. Whereas animal studies paved the way for research on OT in human romantic attachment, a direct assessment of central OT levels via brain neurochemistry in humans would be invasive. Although the link between peripheral and central OT levels remains a topic of debate (Macdonald & Feifel, 2013), increasing anatomical and functional evidence does suggest the two are connected (Carson et al., 2015). Due to these factors and the nature of our study design, this study does not allow for any conclusions about underlying neural correlates and mechanisms through which validating sexual communication behaviors might influence, or be influenced by, OT. Prior research has revealed a high density of OT receptors in brain systems associated with attachment formation, such as the substantia nigra, the globus pallidus, and thalamus (Acevedo et al., 2012), suggesting a neurological basis for OT's role in romantic bonding. In addition, in both healthy controls and individuals diagnosed with neurodevelopmental disorders (e.g., schizophrenia), peripheral peptide concentrations have been associated with central nervous system activity (Carter et al., 2020). Though our findings point at a neurophysiological involvement in sexual communication patterns of romantic partners in the early stages of their relationship, further research is needed to establish the mechanisms underlying these associations.

Another limitation involves the fact that our study did not include measurement of vasopressin (AVP), a neuropeptide that shares functional overlap with OT in socioemotional and cognitive processes in humans and animals (Carter, 2017a; Plasencia et al., 2019). Such assessment would be highly informative and future studies could benefit from examining the two neuropeptides together. Also, we focused on a community sample of heterosexual couples, and the inclusion and exclusion criteria used (in terms of children, sexual function, etc.) ensured a minimal influence of variables that were beyond the scope of our research. Future studies could include more heterogeneous and diverse samples, in terms of ethnicity and education as well as relationship duration, sexual function, and sexual orientation.

We did not find any associations between menstrual cycle phase and plasma OT levels in our sample. Previous research has revealed plasma OT fluctuations over the course of the menstrual cycle (Salonia et al., 2005). It should be noted, however, that a more recent study found no association between OT levels and contraception use or menstrual cycle (Weisman

et al., 2013). In addition, the influence on OT levels of exogenous hormone use, such as hormonal contraceptives , and the effects of menstrual cycle variation are not always replicated (Light et al., 2005; Schneiderman et al., 2014; Tabak et al., 2011). Hence, evidence suggests that controlling for contraceptive use and menstrual cycle variation may not have affected our results significantly.

A final limitation is that the design of our study was correlational in nature and we measured plasma OT only once, prior to the couple discussions. This approach assumes a stability in OT levels, which is supported by findings of some previous studies showing high intra-individual stability of peripheral OT levels over a period of 6 months in individuals (Weisman et al., 2013) and couples (Schneiderman et al., 2012). Additionally, Smith et al. (Smith et al., 2013) found no changes in plasma OT levels measured repeatedly, following positive and negative couple interactions. It should be noted, however, that studies have revealed variations in OT levels in response to specific situations or contexts such as breast feeding, sexual activity, exercise, affiliative touch, and stress (Carter et al., 2020; Ellis et al., 2021; Jong et al., 2015; MacLean et al., 2017; White-Traut et al., 2009) and have highlighted the association between changes in OT levels and behavioral variables (McClung et al., 2018). Additionally, the question remains whether single measurements of baseline OT concentrations in plasma or saliva are a reliable trait marker of the physiology of the OT system in humans (Martins et al., 2020), contradicting the previous studies reporting within-individual stability cited above. However, our study, which included 252 participants, supports the approach used in previous studies exploring associations with endogenous OT, and which tend to be based on sample sizes of less than 100 participants (Torres et al., 2018). To further substantiate our findings, future research could benefit from repeated measurements as they would allow for an exploration of causal relationships between our variables of interest. This approach would also allow for the further exploration of the stability of OT levels within individuals, and the question of whether validating behaviors during sexual discussions are better predicted by such trait-like dimensions of OT or by more reactive, adaptive OT release triggered by contextual demand (e.g., anxiety or threat associated with sexual communication).

In our study, we measured peripheral OT using blood samples as a proxy for central OT levels (Carson et al., 2015; Feldman et al., 2011; Taylor et al., 2010). It should be noted that the associations between peptide levels in saliva, blood, and the brain are still not well-understood (Quintana et al., 2018) and OT levels in saliva have been described as superior to plasma OT levels in indexing concentrations in the cerebrospinal fluid (Martin et al., 2018). However, in a recent study, MacLean et al. (2019) concluded that discrepancies do not automatically reflect errors or invalid measurements, stating that “we should consider the possibility that different measures capture different components of the biological story that

OT has to tell" (p. 9). Additionally, studies have found no increase in salivary OT after administration of exogenous OT, raising the question of how OT reaches saliva if not through blood (Martins et al., 2020; Quintana et al., 2018). Hence, we believe that plasma OT levels provide a valid operationalization to explore our current research question, yielding results that are consistent with findings from prior studies associating peripheral plasma OT levels with positive communication behaviors (Gouin et al., 2010; Light et al., 2005; Schneiderman et al., 2012). Since this is the first study to look at peripheral OT levels and sexual and nonsexual couple communication, we believe our results are promising and lay a foundation for more research on associated processes and underlying mechanisms.

Conclusion

This is the first study to examine the association between endogenous OT and couple communication behaviors during sexual and nonsexual conflict discussions. Our findings revealed a positive association, in both partners, between plasma OT levels and validating behaviors during sexual discussions. Plasma OT levels were not associated with negative and affectionate behaviors during either sexual or nonsexual discussions in our sample of young, heterosexual couples. Our data suggest neurophysiological involvement in the sexual communication patterns of couples and point at the need for further research on the neurohormonal basis of sexual communication.

CHAPTER EIGHT

GENERAL DISCUSSION

CHAPTER EIGHT: GENERAL DISCUSSION

8.1. Overview of the Findings

This doctoral thesis examined the contributions of different dimensions of couples' sexual relationship to relationship satisfaction. We consider this to be an important topic because relationship quality and satisfaction are key to individual well-being and health, and research has indicated that the quality of a couple's sexual relationship is a unique and critical component of romantic relationships. Moreover, focusing on new and less established relationships allows for the exploration of the role of these sexual characteristics of the romantic relationship during what could be considered a critical period, in terms of relationship development, and may reveal meaningful themes more specific to the early stages of romantic relationships. This thesis brings together areas of sex and relationship research and examines this research topic using a multi-method approach, which we believe can render insights relevant to both future research and, subsequently, clinical practice. In the following, we will summarize and interpret our results in the context of the four research aims (see Chapter Two).

Aim 1.

Examine the importance of sexual frequency and sexual communication in young, mixed-sex couples in the early stages of their relationship.

Considering that two of the most common challenges in sex therapy involve couples not having sex as frequently as one or both partners would like and couples experiencing difficulties communicating about sex, there has been a wealth of research supporting the importance of either sexual frequency or sexual communication to sexual and relational outcomes. During the first few years of a relationship, couples often experience a sharp decline in sexual frequency, but the connection between sexual frequency and other variables, including communication, and their separate and joint influence on sexual and relational outcomes are not well-understood. Our first aim was to examine exactly how important sexual frequency and sexual communication are during this critical period of relationship development. These two variables have consistently been found to be important but have been either explored in isolation or with a focus on either sexual or relationship satisfaction, and not both. For these reasons, we still know relatively little about the importance of these different processes to relationship outcome measures, which have been associated with therapeutic success (McCarthy et al., 2004), and our study is the first to examine the

contribution of both sexual frequency and sexual communication to both sexual and relationship satisfaction in young, heterosexual couples. We found that sexual communication and sexual frequency both predicted sexual satisfaction, but only sexual communication predicted relationship satisfaction (Chapter Four). These results suggest that, contrary to popular belief, the evaluation of one's relationship in more general terms is more strongly impacted, even in younger couples (in terms of age and relationship duration), by the assessment of how one, as a couple, communicates about the sexual relationship than by the frequency of sex itself.

Aim 2.

Examine the associations between different sexual behaviors and relationship satisfaction and test the impact of individual variables (attachment) on these associations.

The findings of Aim 1 indicate that sexual frequency, when directly compared to sexual communication, is associated with sexual but not relationship satisfaction. The second aim of this doctoral thesis was to assess whether there may be exceptions to this more general pattern, by examining whether certain variables, specifically individual differences in attachment style, may moderate the association between sexual frequency and relationship satisfaction (Chapter Five).

In many, if not most couples, romantic partners are both attachment figures and sexual partners, and although the empirical literature on the role of attachment dimensions in adult sexual and romantic relationships continues to grow, not as much research yet applies a dyadic perspective to the study of the interplay between attachment, sexuality, and relationships. Also, research differentiating between different behavioral characteristics of the sexual relationship, for example between sexual intercourse and other intimate behaviors, remains scarce. In Chapter Five we explored the influence of both partner's attachment dimensions on the link between different behavioral expressions of sexuality on relationship satisfaction.

Whereas our first study operationalized sexual frequency by creating a composite measure, using the averages across four sexual behaviors (genital stimulation, receiving oral sex, giving oral sex, and penile-vaginal intercourse), for our second aim we divided the behavioral aspects of the sexual relationship into two variables, sexual behavior (including receiving oral sex, giving oral sex, stimulating genitals, and vaginal penetration) and intimate behavior (including cuddling and kissing). In line with our findings of Aim 1, we found no direct link between sexual behavior and relationship satisfaction in our sample. However, when controlling for both partners' attachment dimensions, a more nuanced picture emerged,

as we found significant associations between sexual behavior and relationship satisfaction specifically for anxiously attached individuals. Interestingly, when differentiated from sexual behavior, we found that intimate behavior was associated with relationship satisfaction in avoidantly attached individuals, but not in anxiously attached individuals. The results are consistent with the generally described impact of anxious attachment on the role of sexuality and intimacy in romantic relationships, but contradict the predominating idea that avoidantly attached individuals prioritize sexual behavior over intimate behavior, and vice versa for anxiously attached individuals (G. E. Birnbaum et al., 2006; Brassard et al., 2007; Dewall et al., 2011).

By differentiating between different forms of behavioral expression of sexuality in romantic relationships, our results add to the literature on the intricate interplay between attachment and sexuality in relationships. It has been stated that the development, maintenance, and break-up of attachment relationships are among the strongest emotional experiences people can experience during their lifetime (Fraley, 2019). A better understanding of attachment and underlying associated processes is therefore an important research goal, as much remains to be discovered about their role in sexuality and relationships.

Recently, studies have highlighted the importance of attachment orientations to sexual and relationship satisfaction in more sexually diverse samples (Mark et al., 2018), their impact on interest in partner orgasm (Barnett et al., 2018) and on sexual coercion in couples, with some of these associations being mediated by couple communication patterns (Dugal et al., 2021). Also, although not discussed in our study (Chapter Five), research on attachment and sexuality in clinical samples touches upon related, relevant themes. For example, Charbonneau-Lefebvre and colleagues (2021) found a connection between attachment insecurity, and especially attachment anxiety, and couples' adaptation to and coping with provoked vestibulodynia. Also, a prospective dyadic study (Charbonneau-Lefebvre et al., 2019) found that attachment anxiety was associated with lower confidence in pain-management and long-term, persistent pain in women with provoked vestibulodynia. In another study, Leclerc and colleagues (2015) found that sexual assertiveness mediated the relationship between attachment orientation and sexual function and satisfaction in women with provoked vestibulodynia. The value of attachment theory in the context of sexual dysfunctions has also been explored in couples seeking fertility treatment (Purcell-Levesque et al., 2019) and in survivors of childhood sexual abuse (Gewirtz-Meydan & Ofir-Lavee, 2021).

Overall, these clinical studies shed light on important interpersonal dynamics in the lives of couples dealing with sexual dysfunction. Furthermore, they all point at the need for clinical attention towards attachment-specific needs when a couple experiences sexual problems, by helping them build a more secure and attachment-aware context within which they can safely explore their sexuality. Also in our nonclinical, community sample of young

couples in the early stages of their romantic relationship, more anxiously attached and more avoidantly attached individuals were generally more prone to experience lower relationship satisfaction. This could increase the possibility of relational difficulties, leading couples to seek professional help. By creating and increasing awareness to how individual needs on the sexual and intimate level are shaped and met differently depending on individual variables such as attachment dimensions, our findings can provide a better handle on how to transform unsatisfactory sexual and relational experiences, by targeting needs on the individual as well as the dyadic level. An important step in translating this awareness to practice, involves building communication skills, on the level of the dyad, to facilitate the discussion of sex. Over the course of their relationship, couples may be confronted with changing needs and desires, including those regarding intimacy and sexuality, and how a couple communicates about and deals with such changes can shape and impact relational stability (Karney & Bradbury, 1995; McNulty et al., 2021).

Aim 3.

Examine the characteristics of observed couple communication behaviors during sexual and nonsexual discussions and their associations with relationship satisfaction.

The findings of Aim 1, described in Chapter Four, highlight the importance of sexual communication to relational outcomes in our sample of young, heterosexual couples. Our third aim builds on this work and focuses on questions of exactly how couples communicate sexuality-related topics in their relationship; whether there are observable differences in the way couples handle sexual and nonsexual topics; and how different affective expressions during these discussions are associated with relationship satisfaction (Chapter Six). Though the quality of couple communication in both the sexual and nonsexual domain has consistently been found to be associated with relationship well-being and stability, research on sexual communication is predominantly based on self-report questionnaires. Although this method can provide interesting insights in how partners experience communication in their relationship, it relies on the participants' perceptions of their own or their partner's perceptions of communication style and skills. Another way to assess communication between romantic partners involves videotaping couples as they discuss problem areas in their relationship and then coding these recorded interactions for theoretically relevant themes, such as positive and negative affective expressions, approach/withdrawal, or supportive/hindering behaviors.

Observational studies of romantic couples do not rely on participants perceptions, introspection, or self-awareness, which can be colored by individual traits such as attachment style (McNeil et al., 2018). Also, the coding of couple interactions (Muise et al., 2018) can compensate for unawareness of the participants of changes in their behavior or differences in communication depending on topic (Fletcher & Kerr, 2010). And, finally, this measurement approach more directly resembles clinical practice (Johnson et al., 2005) as the observation of couple interactions is an important aspect of the evaluation of both more constructive and destructive communication patterns in sex and relationship therapy. However, observational studies have not distinguished between sexual and nonsexual discussion topics, with two exceptions (Rehman et al., 2011; Rehman et al., 2017). Building on this previous work, our study was the first to explore differences in sexual and nonsexual communication patterns while assessing their association with relationship satisfaction.

The system used to code the observational data (see the supplemental materials in Chapter Six) was based, in part, on the Specific Affect Coding System (SPAFF) (Gottman & Krokoff, 1989), a widely used system for coding couple interactions, and the System for Coding Interactions and Family Functioning (SCIFF) (Lindahl & Malik, 2001). Only codes with Intra-Class Correlation (ICC) scores in the good or excellent range (ICC ≥ .60) were included in the analyses. In addition to codes that were adapted from these coding systems, we included two new codes, related to annoyance: irritability and frustration (1), and lightness (2), resulting in a total of four negative and five positive codes. Factor analyses on the different scores revealed three higher-level factors: Negative behaviors (level of conflict; contemptuous behaviors; domineering and belligerence; and annoyance and frustration), Affectionate behaviors (lightness; collaboration; and affection), and Validating behaviors (understanding and validation; interest in and seeking out the partner's perspective). We found that communication behaviors differed between the two discussion topics. More specifically, sexual discussions, compared to nonsexual discussions, were characterized by fewer negative and by more affectionate and validating behaviors. In addition, a significant main effect for gender was found for negative behaviors, in that women displayed more negative behaviors than men during the two discussions. Expressions of positivity (affectionate and validating behaviors) predicted greater relationship satisfaction in one's partner, independent of gender or discussion topic. However, for negative behaviors, the findings were qualified by gender: Men's negativity during sexual discussions was negatively associated with their own and their partner's relationship satisfaction.

These findings add to a growing body of research and indicate that sexual and nonsexual couple communication have unique qualities, which are predictive of relationship satisfaction in different ways for women and men. Interestingly, our findings also indicate that romantic partners tend to soften their communication when discussing sexual conflicts,

specifically, and this adjustment may be a way for them to adapt to the potentially higher perceived threat of sexual communication. This was consistent with our hypothesis that couples would adopt more positive and less negative behaviors during sexual, as compared to nonsexual, communication and that observed positive behaviors during both discussions are associated with self-reported relationship satisfaction. The pattern of gender differences in the association between negative behaviors and relationship satisfaction when discussing sexual conflicts, suggests that the sexual domain may have greater relevance for men's relationship satisfaction, a finding that would have to be replicated in further research.

Aim 4.

Explore the association between oxytocin and observed communication behaviors during sexual and nonsexual couple discussions.

The fourth aim of this doctoral thesis was to explore the neurophysiological involvement of oxytocin (OT) in observed dyadic sexual and nonsexual communication patterns (Chapter Seven). The role of OT in close relationships is complex, as both positive and negative associations have been found between OT and relationship processes, and with most research focusing on the effects of exogenous OT administration on communication or couple behaviors, our knowledge about the association between endogenous OT and couple dynamics remains limited. We hypothesized to find a significant correlation between peripheral OT levels and prosocial communication behaviors and based on the intimate nature of sexual communication, we also predicted stronger associations between these OT levels and communication behaviors during sexual discussions.

We found significant positive associations between plasma OT levels and validating behaviors, in both women and men, yet only during sexual discussions. APIM analyses revealed significant associations between both one's own and one's partner's validating behaviors during sexual discussions and OT levels. This study highlights the biobehavioral aspects of couples' sexual communication and the value of further investigating such linkages through a multimethod lens, which unfortunately remains underrepresented in the current literature. Previous studies mainly focused on other behaviors such as affectionate touch and interpersonal focus and found associations with OT levels in romantic partners. Together with these findings, our results point at the possibility of a bio-behavioral feedback loop, in which higher levels of reciprocity and touch may increase involvement in the relationship at the physiological, behavioral, and representational level.

Consistent with Feldman's bio-behavioral synchrony model (2012), our results underline dyadic linkage between partners' hormones and behavior, in that both the

individual's and the partner's validating behaviors during sexual discussions were associated with OT levels. According to the bio-behavioral synchrony model, bond formation is characterized by neurohormonal and behavioral attunement between partners as well as by mutual influences between the physiology of one partner and the behavior of the other. In a similar vein, our findings indicate that the effects of neurohormonal processes on bonding are not limited to the level of the individual but are also impacted by the partner's behavior. By moving beyond the individual and including the dyad as the unit of analysis, we can obtain a more complete picture of the possible interactions between hormones and behaviors, or "fuller biobehavioral matrix" (Schneiderman et al., 2014), in which hormones can shape relational behaviors and vice versa.

In Chapter Six we found that participants tend to soften their communication behaviors when discussing sexual topics compared to nonsexual topics, and prior studies have indicated that sexual conflict discussions are associated with higher levels of anxiety (Rehman et al., 2017) and tend to be avoided more easily (Chesney et al., 1981; Peplau, 2003). With studies suggesting that OT can facilitate the transformation of anxiety and avoidance into approach and positive emotional states (Carter, 1998), our results in Chapter Seven are consistent with the possibility that OT may be part of a process that helps transform avoidance and associated behaviors into active engagement and communication with one's partner, in which validation may serve as a particularly effective form of approach behavior.

Recently, some studies on physiological processes and their associations with couple functioning have provided some additional insights in how partner experiences may be a potential pathway through which relationships affect health. For example, a study in young heterosexual couples (Schacter et al., 2020) found that men's nocturnal heart rate could be predicted by their female partner's daytime relationship feelings: When women felt closer to their male partner, the male partner exhibited lower overnight heart rate, and when women felt more annoyed, their partner exhibited increased overnight heart rate. These gender-specific findings suggest that negative couple interactions may amplify physiological arousal and possibly increase cardiovascular problems over time, whereas positive couple interactions may promote restorative processes during the night. Additionally, attachment has been found to moderate the association between dyadic compassion and heart rate (Corner et al., 2019). Furthermore, the way couples approach and resolve conflict has been found to be linked to health-related physiological processes in daily life. For example, Bierstetel and Slatcher (2020) found, in a multi-method observational study, significant associations between overall positive, but not negative, communication behaviors and diurnal cortisol patterns, with a steeper (healthier) daily cortisol slope in individuals who experienced more positive behaviors with their partner. Diurnal cortisol patterns have been described as a key biological pathway through which social relationships affect long-term health (Slatcher et al., 2015), with steeper

cortisol slopes at 10-year follow-up being associated with greater perceived partner responsiveness (defined as "the extent to which individuals believe that their romantic partners care about, understand, and validate their thoughts and feelings" (Reis, 2012)). As a final example, Mattson and colleagues (2019) found a link between the oxytocin receptor gene and marital quality via social support behavior and perceived partner responsiveness, supporting the notion that genotypic variation may have context-dependent influences on social behavior in a marital context. Together with our findings from Chapter Seven, these studies highlight that subtle connections between relationships and health may begin early in relationships and can be investigated by focusing on specific physiological processes. Replication and extension of such findings will provide a more complete picture of the mechanisms through which couple interactions may be associated with physiological well-being and health. In the context of mental and physical health, these results underscore the value of studying dyadic interactive processes (e.g., validating couple communication behaviors, closeness, compassion) and their association with specific physiological processes.

Interpreting Sexual Interactions:

Tying the Pieces Together.

First, whereas both sexual frequency and sexual communication are relevant to sexual satisfaction, only sexual communication predicted relationship satisfaction in our sample. Second, we found that the association between sexual frequency and relationship satisfaction was impacted by an individual's attachment orientation. Third, observed communication behaviors during sexual discussions were characterized by fewer negative and more affectionate and validating behaviors as compared to nonsexual discussions. We found gender differences in the association between observed negative behaviors during sexual discussions and relationship satisfaction, with only men's behaviors linking to their own and their partner's relationship dissatisfaction. Affectionate and validating behaviors predicted greater relationship satisfaction in one's partner, independent of gender or discussion topic. Fourth, we found evidence for neurophysiological involvement of OT in the sexual communication patterns of couples. Peripheral levels of plasma OT were associated with validating communication behaviors during sexual communication, not with other affective expressions, nor with any of the expressions coded during the nonsexual discussions.

Confirming and extending past empirical and theoretical work emphasizing the importance and unique contribution of sexual communication, Chapter Four, Chapter Six and Chapter Seven of this doctoral thesis underscore to the notion that sexual issues touch upon aspects of the self and the relationship that are particularly sensitive and salient. This

observation is consistent with clinical observations and reflected in couples' therapy, where intimacy and sexuality-related concerns and problems are among the most prevalent (Peplau, 2003). The results of this doctoral thesis indicate that the quality of sexual communication outweighs the quantity of sexual frequency, even in the early stages of the romantic relationship, and they reveal differences in the affective expressions during sexual and nonsexual discussions and which expressions are associated with relationship satisfaction, as well as hint at the potential qualities and relevance of the neurophysiological dimension of sexual communication, which could be explored further in future research.

As discussed in the first chapter, several theoretical perspectives can be used to examine the role of sexuality in committed relationships. The current research project entails an in-depth exploration of how different aspects of dyadic sexuality contribute to relationship satisfaction; however, inherent to its explorative nature, it is limited in its theoretical bearing. Notwithstanding, our findings indicate that both individual-based factors (such as attachment anxiety) and couple-level adaptive processes (such as couple communication, with an overall softening during sexual communication), impact the way sexuality is experienced in couple relationships, and consequently affect relational well-being. This resonates with the principles of the Vulnerability-Stress-Adaptation Model (VSAM), in which both bottom-up and top-down processes interact in the maintenance of relational well-being. However, our conceptual and methodological approach drew upon multiple ideas to gain complementary insights into our study subject, rather than adhering to a single paradigm. Though exploring a more theoretically fueled trajectory could have yielded a stronger scientific contribution to challenge the explanatory pluralism associated with sexuality and sexual behavior (Meirmans & Strand, 2010), the larger project of which this dissertation is a part (see 8.3), is in line with current challenges in the field of interpersonal emotion dynamics, which faces the need of revising within-person processes and the reciprocal connections with relationship quality, in the quest to the development of a more encompassing theoretical framework (Butler, 2018). It should be noted that theories on interpersonal aspects of sexuality are scare (Dewitte, 2014), which sharply contrasts the theory-rich discipline of relationship science (Finkel et al., 2017). As noted by Muise and colleagues (2018), sex research has traditionally lacked strong theoretical influence, due to its interdisciplinary nature, and theories "have not been closely linked to research methods" (p.541). This research project is no exception to this, as it is not designed to explore or inform specific theoretical questions. However, by applying theoretical perspectives grounded in relationship research (e.g., attachment theory) we hope to have provided insights into the processes or mechanisms through which sexuality influences relationships and how individual differences shape these outcomes.

The separate aims and chapters do not allow for a more complete picture of possible mediation and moderation variables (also discussed below in the limitations); however, they

do emphasize the importance of taking both individual and couple-level processes into consideration. In a similar vein, findings from Chapter Seven indicate that the effects of neurohormonal processes on attachment formation are not limited to the level of the individual but are also impacted by the partner's behavior, which is in line with the bio-behavioral synchrony model by Feldman (2012), that states that bond formation is characterized by neurohormonal and behavioral attunement between partners as well as by mutual influences between the physiology of one partner and the behavior of the other. While exploratory in nature, our findings highlight the value of applying a dyadic framework to the scientific study of sexuality. Specifically, based on a range of different methodologies, our results contribute to past empirical and theoretical work consistently emphasizing the importance and unique contribution of sexual communication to relational outcomes.

Although most of our studies, with the exception of the one described in Chapter Five, did not include specific hypotheses about partner effects, several observations can be made based on our results. Interestingly, using self-report measures (Chapters Four and Five), we found no partner effects of self-reported sexual communication or frequency on relationship satisfaction. However, we did find partner effects of attachment anxiety and avoidance on relationship satisfaction (Chapter Five), as well as partner effects of observed communication behaviors on relationship satisfaction (Chapter Six). Furthermore, we found that partner validating behaviors during sexual discussions were significantly associated with one's own OT levels (Chapter Seven). The distinction between actor and partner effects is a key element in much of contemporary relationship research (Kenny et al., 2006), and our study findings indicate the value of moving the measurement of such effects beyond the use of self-report data. A logical next step would be to examine the effects of operationalizations of a specific construct on relationship outcome measures (e.g., self-reported versus observed sexual communication), as a way to assess to what degree differences may reflect perceptual bias (either by the participant or the observer) or "sentiment override"[19] (Weiss, 1980), and whether or not this would alter current insights in certain relationship dynamics. This would allow for answers neither methodology can provide on its own. In a recent large-scale study applying machine learning on the data from 43 dyadic longitudinal datasets, involving 29 laboratories, Joel and colleagues (2020) found that people's own relationship-specific judgements, rather than those of their partner, predicted relationship quality. However, as this study relied almost exclusively on questionnaire-based data, including other methodological approaches might lead to other conclusions. This has also been addressed in a recent study by McNulty and colleagues (2021), who extended the VSAM (discussed in Chapter One), and

[19] "Sentiment override" refers to the tendency of an individual's overall perspective on their partner or their relationship to color each interaction they have with this partner or to affect their reports of these interactions.

showed that qualities (former 'vulnerabilities') of both partners shape behavioral exchanges (the 'adaptive processes'), how these behaviors explain how both partners' qualities predict relationship satisfaction, and how stress determines the effect of qualities and behavioral exchanges on relationship satisfaction over time. This complex interplay indicates the value of a continued consideration of both individual and dyadic characteristics, using self-report and observational methodology, in studying relationship dynamics and (changes in) relationship satisfaction.

8.2. Limitations and Research Opportunities

We already touched upon some limitations in the prior section and each empirical chapter includes a discussion of the limitations of the specific study, but below we will restate some of these limitations and reframe them as considerations for future research in this field.

8.2.1. A Call for Diversity

We applied our inclusion criteria (see Chapter Three) to minimize interpretative difficulties common in studies using more heterogeneous samples (e.g., high variability in relationship duration, combining those in a first or subsequent relationship, couples with or without children). An important future direction would be to recruit more heterogeneous and also more diverse samples. The current study is part of a small body of research that looks at couple communication patterns outside of North America, where the majority of relationship research is conducted. As such, we believe that our study contributes to the literature by showing that some of the findings on sexual communication that have been observed in North American samples (Rehman et al., 2011; Rehman et al., 2017) also extend to a Western European sample. Yet, as is true for most other research conducted in this area, our study lacked in diversity in various ways, including when it comes to sexual orientation and relationship type. The aims were limited to mixed-sex couples in a heterosexual relationship.

We are aware of the problems and shortcomings associated with excluding (sexual) minority couples from research and it definitely is not our goal to reinforce a heterosexual norm or focus in sex research (DeLamater & Hyde, 2004; Thorne et al., 2019). At the same time, we realize that similar concerns could be raised about other variables (e.g., race). In a similar vein, parenthood and sexual dysfunction have been reported to affect relationship satisfaction (see: Dewitte & Mayer, 2018; Lawrence et al., 2008; Twenge et al., 2003). When it comes to considerations of couple composition or gender/sex, we lack a clear theoretical or empirical basis for the development of hypotheses about possible orientation-related differences. However, by explicitly acknowledging that we limited recruitment to mixed-sex couples, we hope to help raise awareness of the heterosexual tenor in dyadic research. Earlier

research is often not explicit in this limitation, which implies a generalization of findings to other sexual orientations, perpetuating misperceptions about the overwhelming presence of heterosexuality in our society. To challenge this generalization, an important future avenue will be to study other sexual orientations, genders, and relationship forms.

We hope future research on the topics studied in this doctoral thesis will include a focus on more established relationships and older couples, as well as clinically distressed couples. As described in the outline of the current research (see Chapter Two), we decided to focus on young couples in the early stages of their relationship. Though it may be argued that young people face relatively few challenges to their sexuality and relationships in comparison to older individuals or couples, we believe this focus is justifiable and supported by evidence from longitudinal studies that have found that most changes in couple dynamics, especially those involving changes in sexual frequency, sexual satisfaction, and relationship satisfaction are expected to occur during the first years of a relationship (Call et al., 1995; Greenblat, 1983; McNulty et al., 2016). Hence, the variables investigated in this thesis can be considered salient contributors to the main relational outcome measures in this specific population (i.e. sexual and relationship satisfaction), and we therefore do not consider this focus a challenge or impediment to internal or external validity with respect to the questions we wished to explore. We also focused on early relationships, with couples still more or less in their 'honeymoon phase' (Lorber et al., 2015), as we wished to follow couples over time, and the project on which this dissertation is based is longitudinal in design. Although, we did not explore longitudinal patterns in this thesis, we intend to do so in the future (see 8.3).

Although the recruitment for the research presented in this thesis was broad and inclusive in approach, our sample, unfortunately, was not particularly diverse, in terms of ethnicity and education for example, raising questions on the representativeness of our sample and generalizability of our findings. Indeed, our observations and conclusions are drawn from what can largely be considered a WEIRD sample (Western, Educated, Industrialized, Rich, and Democratic) (Henrich et al., 2010), which has been described as "a certainly narrow and potentially peculiar subpopulation" (Henrich et al. 2010, p. 63). Related to this, concerns can be raised about possible ascertainment or volunteer biases, especially given the sensitive nature of our study topic. Differences in, for example, sexual attitudes and experiences, between volunteers and non-volunteers for sexuality-related studies, and specific effects of individual variables (e.g., erotophilic attitudes) and study design (e.g., invasiveness of study procedure) on willingness to participate in sex research have been described (Bouchard et al., 2019; Dawson et al., 2019; Strassberg & Lowe, 1995). However, generally speaking, differences tend to be small and other studies have shown considerable variance in such variables among volunteers. It has been argued (Bogaert, 1996) that volunteer biases may be more relevant to studies focusing on high-risk social or sexual behaviors, compared to studies aiming to

advance the understanding of more general processes and mechanisms involved in human sexual behavior, such as the work presented in this thesis.

8.2.2. Complexity Reduction

The distinction between an affective (e.g., sexual communication) and a behavioral dimension (e.g., sexual and intimate behaviors) was largely based on and inspired by scientific and clinical evidence highlighting the importance of both qualitative and quantitative dimensions in a couple context (see Chapter One). However, other aspects of sexuality on the dyadic level, such as sexual desire and sexual desire discrepancy, or on the individual level, such as sexual functioning and propensities for sexual excitation and inhibition, were not included in this doctoral thesis. Additionally, several nonsexual contextual factors, such as socioeconomic status (Karney, 2021) and the experience of stress (Nguyen et al., 2020), may also impact relationship dynamics and couple communication, yet, those were not included in this doctoral thesis. For example, daily stressors and the experience of stress (e.g., related to paid or unpaid work, health problems, financial concerns, having to make important decisions) (Williamson, Karney, et al., 2013) affect couple functioning and may result in relationship deterioration. Indeed, links between stress and couple conflict are not uncommon and maladaptive relationship processes may result from processes that include stress spillover (defined as "the transmission of problems across domains") (Timmons et al., 2017). Furthermore, our methodological scope was limited to quantitative operationalizations of the affective and behavioral dimensions of dyadic sexuality, and we did not include qualitative (e.g., interview) methodologies or potentially more ecological valid observations (e.g., couple discussions at home) in this doctoral thesis. Moreover, we applied a more traditional conflict discussion paradigm in our observational research, while other types of dyadic interactions, including positive discussions and decision-making tasks, could have provided additional insights.

Yet, we believe that, in many ways, our work can be considered a stepping stone towards further research at the intersection of sexuality and relationships. Sexuality in romantic relationships is complex as it is a multi-dimensional aspect of life, encompassing intrapersonal, interpersonal, behavioral, psychological, physiological and biological aspects, in a social and cultural context. The current consensus in sex research is that sexual and nonsexual aspects of both partners in the relationship must be considered to move our knowledge beyond the individual (Muise et al., 2018). In this doctoral thesis, we attempted to learn more about and identify key players for both future research and clinical practice, by examining psychological and neurobiological processes, as well as personal and dyadic processes. However, important as they are, research studies like the one presented in this

thesis cannot capture the full range of dyadic sexuality and it is beyond doubt that other factors may moderate, mediate, or interact with the elements included. Even more so, the large body of existing relationship science has identified hundreds of variables that purportedly shape romantic relationship quality. In a recent large-scale machine learning study, using data from 43 dyadic longitudinal datasets, Joel and colleagues (2020) aimed to quantify and compare the predictive power of many such variables and found that sexual satisfaction and partner conflict ranked in the top relationship-specific predictors, whereas negative affect, attachment avoidance, and attachment anxiety ranked in the top individual-difference predictors. Interestingly, they also found that individual-differences and partner-reports had no predictive power beyond a person's own relationship specific experiences, implying that their moderation effects on relationship satisfaction may be of limited relevance.

Whereas the advantages of using a dyadic approach to the study of sexuality are plentiful (see Chapter One), the research presented in this doctoral thesis did not include strong predictions on partner effects. Considering that actor-based variables have been found to predict two to four times more of the variance in relationship quality than partner-based variables (Joel et al., 2020), future studies could explore the possibility that partner effects are more indirect and, for example, involve mediation-like processes. This implies that partner effects might still be important, but perhaps their effects are part of actor-based relationship variables, and that effects of partner-reported relationship variables on relationship quality are mediated by actor-reported relationship variables.

We believe that while more complex (e.g., moderation or mediation-like models) have their place in the literature, they are based on theoretical assumptions about the causal connection between, for example, sexual and relationship satisfaction that have been challenged by empirical data, showing their association can be bidirectional. However, we are aware that the research questions addressed in this thesis are a reduction of the complexity of possible associations between our included variables, but we hope our findings may provide fruitful avenues for future study, including those that can address more complex remaining questions, such as the unfinished tale of causality and directionality.

8.2.3. Causality and Directionality

The results presented in this thesis are based on cross-sectional study, leaving more to be discovered concerning causality and directionality. Specifically, as the influence of sexuality-related variables on relationship satisfaction can be mediated by their impact on sexual satisfaction, we have considered the possibility of mediation for our first study (Chapter Four). However, some studies, especially longitudinal ones, have found that the relationship can be the other way around, or even bidirectional (Byers, 2005; Cao et al., 2019; Fallis et al., 2016; McNulty et al., 2016). Thus, the literature to date remains inconsistent and inconclusive

about this topic, and although the directionality between sexual and relationship satisfaction is an important subject that, indeed, beckons further (longitudinal) study, we believe that the questions we explored in this study have value in and by themselves. That is, we believe that studying how both satisfaction types are impacted individually can improve our understanding of their specific qualities and determinants. Furthermore, even in the presence of strong correlations between two variables, research can benefit from studying individual contributors to those variables. In the absence of clear theoretical frameworks on the primacy of either one variable, it can be (similarly) argued that it is valuable to study predictors of each outcome variable, without focusing on possible mediation by one of the two, which addresses different questions.

MacNeil and Byers (2009), who discuss and tested instrumental and 'expressive pathways', conclude in their limitations that "the direction of the relationship between relationship satisfaction and sexual satisfaction is not known" (p. 12-13). In their 2005 study, Byers (2005) found that although relationship satisfaction and sexual satisfaction changed concurrently, there was only limited evidence to support a causal relationship between the two constructs in either direction. Hence, for our first study (Chapter Four), our focus was on sexual satisfaction and relationship satisfaction individually, in an attempt to better understand the impact of our predictors on both satisfaction types individually. However, we acknowledge that, given that the directionality between our variables remains inconclusive, both theoretically and empirically, most the variables included in this project could be given a different place and role, including mediation analyses. Yet, a recent large-scale study (Joel et al., 2020) indicated that changes in relationship satisfaction over the course of romantic relationships were largely unpredictable from any combination of self-report variables. In the absence of clear theoretical frameworks on causality, or the primacy of certain variables, we believe that future (including longitudinal) studies are more suited to address mediation and directionality. As discussed below, this doctoral thesis is based on a subset of variables, and we recruited longitudinal data for the larger project. It should be noted that the recruitment of couple data is a costly and (both for scientists and participants) labor-intensive endeavor. Hence, individual labs often struggle with finding the resources to test the importance of a growing list of constructs in a significant theoretical framework (Joel et al., 2020). To advance the global body of knowledge, we fully support the idea of a more collectivistic approach to both sex and relationship research, moving science beyond the current academic tenor of individual contributions towards 'team science' (Joel & Eastwick, 2018). In this task at hand, research is needed on specifically the early stages of relationships, when relationship-specific dynamics first emerge, to better understand how individual and dyadic variables may shape these dynamics and overall relationship satisfaction (Joel & Eastwick, 2018), to which our data can make substantial contributions.

8.2.4. From Community to Clinical Populations

Throughout the different chapters, we have discussed possible clinical implications of our findings. However, we are aware that all our findings are based on data collected from a community sample of couples, characterized by high levels of relationship satisfaction. As a result, we cannot generalize these findings to couples who are more distressed or who are receiving sexual or couple therapy. Hence, speculating about or postulating specific links with clinical therapy falls beyond the scope of this doctoral dissertation, and we believe it would be a logical next step to examine whether our findings could be replicated in a clinical sample of distressed couples, or couples consulting with sex or relationship therapists. As noted before, for most sex therapists dealing with distressed couples, therapy goals tend to involve some combination of improving sexual communication and increasing sexual intimacy at a behavioral level (e.g., through exercises, assignments, sensate focus) (Greenberg, 2004; Jones et al., 2018; Masters & Johnson, 1970; Yoo et al., 2014). Although other dyadic sexual processes may be therapeutic targets, prior research has supported the relevance of focusing on communication and behavioral aspects in clinical samples.

Prior research suggests that dyadic sexual communication may be a key treatment target in women with provoked vestibulodynia and their partners (Rancourt et al., 2016), leaving more to be investigated of its relevance and potential in other clinically distressed couples (e.g., in the context of sexual desire discrepancies, sexual dysfunction, or mental health problems). In addition, the value of applying observational methods in clinical samples is also showcased by the research of Bois and colleagues (2016), which highlights the protective qualities of disclosure and empathic response against sexual distress or dissatisfaction in couples dealing with vulvodynia. In line with our research on the behavioral characteristics of the sexual relationship (Chapter Five), other studies have also observed how different sexual and intimate behaviors may have different meanings for couples (e.g., Jodouin et al., 2019). Related to this, Jodouin and colleagues (2018) found that a number of individuals in a nonclinical sample of young newlywed couples did report sexual difficulties, such as lower subjective arousal, which was associated with lower sexual satisfaction in oneself and in one's partner, as well as with a more restricted range of sexual behaviors. This supports the idea that the types as well as range of sexual activities in a dyadic relationship can contribute to sexual satisfaction, highlighting the importance of incorporating a range of sexual and intimate behaviors in the study of dyadic sexuality as well as in potential therapeutic approaches. A recent study by Emond and colleagues (2021) found that sexual concerns, most commonly involving sexual frequency or desire discrepancies, were highly prevalent in consulting couples, even if they were not reported as an initial reason for consultation. This underscores the need for relationship therapists to be trained in the area of sexuality and to expand their knowledge of the range of sexual issues and their respective therapeutic implications.

8.2.5. Beyond Preaching to the Choir

In line with a key element of this doctoral thesis, we would like to close this Limitations section of with an observation. With the work presented in these chapters, we did not only aim to contribute to bridging the gap between sex and relationship research, but also wanted to use the opportunity to emphasize the relevance of taking into consideration more affective dimensions of sexuality in different audiences. The first paper presented in Chapter Four, was published in the *Journal of Sexual Medicine*, a well-respected journal with a history of focusing on somatic sexual health and well-being. With the results presented in our paper, we hope the readership of this journal benefits from learning about how affective dimensions trump behavioral dimensions in the evaluation of relational well-being. In other words, if we can raise awareness among clinicians, from many different backgrounds and working in many different fields, of how different aspects of sexuality may impact different outcomes, a small step is made towards a shift of assigning more weight to affective over behavioral experiences of human sexuality. Additionally, the paper presented in Chapter Seven was published in *Psychoneuroendocrinology*, and although over the past few years over 500 articles have been published in this journal with OT in the title, our study is one of the first manuscripts in this journal focusing on dyadic sexual interactions and their neurophysiological underpinnings. Its inclusion is an indication that the study of sexual communication is gaining not only visibility, but also credibility in realms beyond the sex research audience. We hope our work can continue to reach audiences, within and outside the sex and relationship research audience, as we believe that communication between partners is a construct of transtheoretical significance (see Chapter Six), worthy of a(n even) larger stage.

8.3. Project Contribution and Directions for Future Research

This doctoral thesis is part of a larger research project that includes a longitudinal component. Since the doctoral candidate was responsible for the design, protocol implementation and data collection of the project as a whole, and not just the studies that make up this doctoral thesis, we will briefly discuss the additional research plans and publication opportunities stemming from the (larger) dataset.

To further explore our research questions, including those concerning directionality/causality discussed above, we intend to conduct longitudinal data analysis for future publication. Following the first visit and lab session (T0), participants were invited to fill out questionnaires every 6 months (T0.5, T1, T1.5, T2), with excellent retention rates. Eight of the 126 couples had ended their relationship by T0.5. Of the remaining 118 couples, all but 4 completed the second set of questionnaires (97%). Of the remaining 114 couples, 3 additional couples had ended their relationship, and 5 couple did not respond to our follow-up invitation

to complete the third set of questionnaires. So, of the couples invited, excluding those who broke up, we have a retention rate of 95% for T1. Excluding new break-ups (N = 4) for T1.5 we have a retention rate of 93% (N = 102 invited couples; N = 7 non-responders) and for T2 we invited the remaining 95 couples, among whom 5 couples reported break-up, and 8 couples did not respond to our invitation, leading to a retention rate of 91%. Additionally, from the couples who broke-up, we gathered unique data from 15 individuals concerning their break-up.

Also, the data collected as part of this doctoral thesis allow for additional analysis opportunities. For example, the observational data can be analyzed further using FaceReader, a software program used for automatic recognition and analysis of facial expressions. As part of a Master thesis, Goossens (2018) investigated the associations between emotion-recognition by automated (FaceReader) and self-reports of emotions and relationship satisfaction in a subset of our sample. In addition, we included the measurements of resting heart rate variability (HRV), using a Firstbeat Bodyguard 2 system, during the couple conflict discussions, which have been explored by Gilen (2020). Studies have found that resting HRV, and in particular its parasympathetically-controlled high-frequency component, is associated with self-regulation, emotion regulation, and prosocial behavior (Thayer et al., 2012). Also, resting HRV has been associated with marital quality (Smith, Cribbet, et al., 2011). In addition, blood pressure was measured prior to couple conversations, which allows for additional exploratory analyses.

Furthermore, two master students of the Faculty of Medicine (KU Leuven/ University of Leuven) applied our observation protocol to study, for the first time ever, couple interactions during sexual and nonsexual discussions in a sample of same-sex couples. The inclusion of same-sex couples in future studies is important for several reasons (discussed above), and we hope to continue this line of work in the future. Finally, as part of a PhD project in Statistics, one of our colleagues is using our couple-based data to conduct factor analyses on the Dutch version of one of our questionnaires. Two additional master students based their master thesis on data collected in this project, both focusing on individual sexual propensities and within-couple sexual similarity.

8.4. Sign of the Times: A Note on COVID-19

The data used in this doctoral thesis were collected prior to the COVID-19 pandemic. However, some of the longitudinal data were collected in the midst of global uncertainty. Among other impacts, the pandemic has brought many changes to our social and intimate relationships. With social distancing becoming the norm, social interactions were limited, and most couples have been forced to spend more time together when self-isolating at home. In one study (Balzarini et al., 2020), people in relationships who reported more COVID-related

stressors also reported poorer relationship quality at the onset of the pandemic and over the subsequent three months. However, these associations were buffered by perceived partner responsiveness, or the extent to which individuals believe their partner understands, validates, and cares for them. Although research indicates that the prevalence of relationship problems and conflicts may have increased since the start of the pandemic (Balzarini et al., 2020), processes relevant to the construct of perceived partner responsiveness may indeed help buffer against the negative impact of pandemic-related stressors, including financial strain, stress, and social isolation (Vowels & Carnelley, 2021; Stanton et al., 2019). A national study of 1117 married individuals in heterosexual or same-sex relationships found that relationship satisfaction, the main outcome measure in this doctoral thesis, was relatively stable in both women and men during the pandemic (Kinsey Institute, 2020). However, more women experienced a decrease rather than increase in sexual satisfaction during the pandemic. Early survey reports also indicated that about 75% of cohabitating couples reported that their sex life declined during quarantine (Brooks, 2020). However, couples were actively trying to keep the spark alive. Interestingly, women and men reported engaging more in sexual communication, whereas reports on solo and partnered sexual behaviors indicated a significant decrease compared to years pre-COVID (Lehmiller et al., 2021; Li et al., 2020). These results indicate that partners' sex lives are changing, and that they are adapting to the new circumstances. Either way, "encouraging more novel sexual pursuits with a partner may be a helpful and therapeutic strategy for persons in relationships, particularly those feeling stressed or lonely" (Lehmiller et al., 2021, p. 302). It is our belief that attention to sexual communication and possible routes to facilitate couple's willingness to engage in it, can promote both relational and individual well-being in challenging times, whether that be due to personal bumps down the road, or due to a global pandemic.

8.5. Concluding Comments

This doctoral thesis aimed to provide new insights in the question of how and to what degree affective (e.g., sexual communication) and behavioral (e.g., sexual frequency) dimensions of couples' sexual relationship are associated with relationship satisfaction, as studied through a dyadic lens. We hope the findings contribute to not only a better understanding of one of the most defining relationships in adult life, but that they may lead towards promotion of sexual health and pleasure, debunk basic assumptions about "what good sex should be like", and move sexuality from an individual perspective to a process of dyadic attunement. In an even more ambitious frame, we hope sexual communication not only gains more attention in scientific studies, but in romantic relationships in general, as well as in popular media in which sexuality is often reduced to sexual intercourse, without much understanding of or interest in what precedes and surrounds it. This thesis highlights the

importance of dyadic sexual interactions, above and beyond the mere quantitative dimensions of couple sexuality.

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PERSONAL CONTRIBUTION

The doctoral candidate, Rick Roels (RR), conducted the research presented in this doctoral thesis, with the help of several collaborators. RR was responsible for: conceptualization; study design and methodology; ethical approval of the study design; data collection; data investigation; formal analyses; writing the original draft, reviewing and editing. The contribution of several co-authors has been listed below per chapter. Prof. dr. Erick Janssen (EJ) provided senior supervision and mentorship on the research and writing of all the manuscripts.

Chapters Four and Five

EJ and RR conceptualized and designed the study and its methodology, and reviewed and edited the manuscript. RR was responsible for data collection, the analyses, and the interpretation of findings, and wrote the original draft. EJ acquired funding for the research and supervised the writing process.

Chapter Six

The study and its methodology was conceptualized by EJ, RR, and prof. dr. Uzma Rehman (UR). RR collected the data, and was responsible for data processing, coding, and the initial analyses. Further analyses involved all authors, with the assistance of dr. Jackson Goodnight (JG). RR wrote the original draft and additional review and editing was performed by all authors. Funding was acquired by EJ and both EJ and UR provided senior supervision.

Chapter Seven

The study was conceived by EJ and RR. The methodology was decided on by all authors. Data collection and analyses was performed by RR. Processing and analysis of the blood samples was performed by prof. dr. Sue Carter (SC) and prof. dr. Hossein Nazarloo (HN). RR wrote the original draft, and all authors reviewed and edited later versions. EJ acquired funding for the project, and SC provided additional funding contributing to the analysis of the OT samples. EJ and SC provided senior supervision.

CONFLICT OF INTEREST STATEMENT

The co-authors and the doctoral candidate have no conflicts of interest to report.

DEDICATION

This work is dedicated to all the lovers, especially those who generously donated their time and energy to take part in my research and those who supported me along the way.

ABOUT THE AUTHOR

Rick Roels was born on the 8th of March 1988 in Dendermonde, Belgium. He obtained his diploma general secondary education, majoring in sciences and higher mathematics in 2006. Having received his medical degree (MD) cum laude at KU Leuven in 2014, Rick developed a strong interest in human sexuality during his psychiatry residency at the University Hospital of Leuven (UPC KU Leuven), Belgium, which he started in 2014.

Rick joined the Institute for Family and Sexuality Studies (IFSS), Department of Neurosciences, KU Leuven, in 2016 as a PhD researcher. His PhD research is funded by the Research Foundation – Flanders (FWO) and is supervised by prof. dr. Erick Janssen, professor at the IFSS and Senior Research Fellow at the Kinsey Institute, Indiana University, USA.

In 2019 Rick obtained the postgraduate degree in psychoanalytic psychotherapy (KU Leuven), and obtained a master's degree in human sexuality studies (KU Leuven), magna cum laude. In 2021 he completed his professional training to become a psychiatrist (MD), and graduated summa cum laude in the master of medicine in specialist medicine, specifically adult psychiatry, at KU Leuven.

Since March 2021, Rick works as a licensed psychiatrist, psychotherapist, and clinical sexologist (VVS) at the Department of Psychiatry, UPC KU Leuven. He is responsible for the medical-psychiatric expertise in the Center of Clinical Sexology and Sex Therapy (CeKSS), liaises with somatic departments at University Hospital of Leuven (UZ Leuven) in the management of sexual medicine, and provides psychiatric expertise at the Sexual Assault Care Centre (UZ Leuven). Additionally, he co-supervises the emergency department for psychiatric assessment as well as the outpatient emergency psychiatric consultations (UZ and UPC KU Leuven).

In 2020 he enrolled in the interuniversity postgraduate training Forensic Psychiatry and Psychology, organized by the University of Antwerp, Leuven, Ghent and Brussels, by which he aims to broaden his clinical expertise in forensic psychiatry. Together, these trainings have contributed to Rick's development as a clinician and researcher alike, with a specific interest in the interaction between medical science, human sexuality, and psychotherapeutic perspectives.

CURRICULUM VITAE

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EMPLOYMENT

2021 – current	**Psychiatrist, Staff member in Adult Psychiatry. Department of Psychiatry, UPC KU Leuven, Belgium.**
2016 – 2022	**PhD researcher, Institute for Family and Sexuality Studies, Department of Neurosciences, Faculty of Medicine, KU Leuven, Belgium.** *Project:* 'Affective and behavioral dimensions of sexuality and their relevance to relationship quality'. *Supervisor:* Prof. Dr. Erick Janssen (Institute for Family and Sexuality Studies, Department of Neurosciences, KU Leuven).

EDUCATION

2020 – current	**Postgraduate in Forensic Psychiatry and Psychology.** University of Antwerp, KU Leuven, University of Ghent, University of Brussels, Belgium.
2014 – 2021	**Master in Specialist Medicine Psychiatry, Adult Psychiatry.** KU Leuven, Belgium. *Grade:* Summa Cum Laude. *Thesis:* 'Sexual and relationship satisfaction in young, heterosexual couples: The role of sexual frequency and sexual communication'.
2015 – 2019	**Master of Human Sexuality Studies, M.Sc.** KU Leuven, Belgium. *Grade:* Magna Cum Laude. *Thesis:* 'Sexuality in couples: A narrative review of relevant psychological and neurobiological processes'. *(in Dutch)*

2015 – 2019	**Postgraduate in Psychoanalytic Psychotherapy.** KU Leuven, Belgium. *Thesis:* 'Psychoanalytic psychotherapy and obsessive-compulsive disorder: The capacity for ambivalence'. *(in Dutch)*
2013 – 2015	**Flanders Interuniversity Degree in Specialist Medicine, Psychiatry, Belgium.** *Grade:* Summa Cum Laude.
2009 – 2014	**Master in Medicine, M.D.** KU Leuven, Belgium. *Grade:* Cum Laude. *Thesis:* 'Considerations on deep brain stimulation for treatment refractory obsessive-compulsive disorder in patients with autism spectrum disorder'.
2006 – 2009	**Bachelor in Medicine.** KU Leuven, Belgium. *Grade:* Cum Laude.
2000 – 2006	**Secondary Education Diploma.** Heilige-Maagdcollege, Dendermonde, België. *Major:* Sciences-Mathemetics, 8hrs.

CLINICAL EXPERIENCE

Mar 2021 – current	**Staff member in Adult Psychiatry.** *UPC KU Leuven, Leuven, Belgium.* Center of Clinical Sexology and Sex Therapy; Emergency Psychiatry; Sexual Assault Care Centre; Liaison Sexual Medicine.
Feb 2014 – Feb 2021	**Resident in Psychiatry.** *UPC KU Leuven, Leuven, Belgium.* Experience in: Crisis Resolution Unit; Outpatient clinic for general psychiatry and psychotherapy; Geriatric Psychiatry; Substance Abuse and Dependency; Acute In-Patient Psychiatry; Eating Disorders; Outpatient clinic for obsessive compulsive disorder; Clinical Sexology and Sex Therapy; Psychodynamic Inpatient Psychotherapy; Adult In-Patient Acute Psychiatry in the Hospital Setting.
Feb 2013 – Jan 2014	**Internship in Psychiatry.** *UPC KU Leuven, Leuven, Belgium.* *Grade:* Summa Cum Laude.

Jul 2007 – Jan 2013	**Internships in Medicine.** *University Hospital Leuven, Belgium; University College London Hospitals, UK; Non-University Hospitals in Flanders/Brussels (Belgium) and Oxford (UK).* Experience in: Pediatrics; Gynecology; Internal Medicine; General Medicine; Neurology; Psychiatry; Ophthalmology; Surgery Discipline; Neurosurgery; Health Care System and Nursing.

SUPERVISION SCIENTIFIC WORK

2016 – current	Supervision of master theses by students of the Master program Human Sexuality Studies, Faculty of Medicine, KU Leuven.
2016 – 2020	Training, supervision, and coaching student researchers and honours program students of the Department of Neurosciences, Faculty of Medicine, KU Leuven.

OTHER RELEVANT EXPERIENCE

2021 – current	Visiting Lecturer providing psychiatric expertise for training at the Sexual Assault Care Centre. *Flanders, Belgium.*
2020 – current	Licensed Clinical Sexologist. *UPC KU Leuven, Leuven, Belgium.*
2019 – current	Licensed Psychoanalytic Psychotherapist. *UPC KU Leuven, Leuven, Belgium.*
2016 – 2020	Member of the panel discussion group, Annual summer school of Psychiatry. *UPC KU Leuven, Leuven, Belgium.*
Jan 2019	Trained in coding couple communication, by Dr. U. Rehman, PhD. *University of Waterloo, Ontario, Canada.*
Oct 2018	Workshop Research Integrity II. *University of Leuven, Belgium.*
Jul 2018	Dyadic Data Analysis Workshop, by Dr. D. Kashy, PhD. *Michigan State University, Michigan, USA.*
2017 – 2018	Co-organizer Scientific Seminars Psychiatry. *University of Leuven, Belgium.*
Feb 2017	Course Good Clinical Practice. *University of Leuven, Belgium.* Certificate obtained.
Sept 2016	Course Research Integrity. *University of Leuven, Belgium.*
2010 – 2011	Course Medical English. *Leuven Language Institute (ILT), Leuven, Belgium. Grade:* Magna Cum Laude.

PROFESSIONAL MEMBERSHIP

International Academy of Sex Research (IASR);
Flemish Society of Psychiatry (VVP);
Flemish Society of Psychoanalytic Psychotherapy (VVPT);
Flemish Society of Sexology (VVS);
World Association of Sexual Health (WAS).

INTERESTS & SKILLS

Music	Music producer from 2008 to 2014. International releases, press and performances.
Photography	Degree in Photography at the Central Saint Martins, College of Art and Design 2010. *University of the Arts London, London, UK.*
Leisure activities	Gardening; CrossFit.
Language	Dutch (Native Proficiency); English (Full Professional Proficiency); French (Professional Working Proficiency).
Driver's license	Category B.

LIST OF PUBLICATIONS

Published Manuscripts

- **Roels, R.**, Rehman, U., Goodnight, J., & Janssen, E. (in press). Couple communication behaviors during sexual and nonsexual discussions and their association with relationship satisfaction. *Archives of Sexual Behavior*.
- **Roels, R**, Janssen, E. (2021). Attachment orientations, sexual behavior, and relationship satisfaction in young, mixed-sex couples: A dyadic approach. *Journal of Sex & Marital Therapy*, 4:1-20. doi: 10.1080/0092623X.2021.1982799.
- **Roels, R.**, Rehman, U.S., Carter, C.S., Nazarloo, H.P., & Janssen, E. (2020). The link between oxytocin plasma levels and observed communication behaviors during sexual and nonsexual couple discussions: An exploratory study. *Psychoneuroendocrinology,* 129, 105265. doi:10.1016/j.psyneuen.2021.105265.
- **Roels, R.**, & Janssen, E. (2020). Sexual and relationship satisfaction in young, heterosexual couples: The role of sexual frequency and sexual communication. *Journal of Sexual Medicine*, 17, 1643-1652.
- Volkaerts, L., **Roels, R.**, & Bouckaert, F. (2019). Motor function improvement following ECT in a Parkinson's disease patient with DBS. *Journal of ECT*. doi: 10.1097/YCT.0000000000000627
- **Roels, R.**, & Janssen, E. (2017). Het hypofysaire hormoon oxytocine: nieuwe speler in het seksuele veld? In E. Slager (Ed.) *Reproductieve geneeskunde, Gynaecologie en Obstetrie, anno 2017*. Heemstede: DCHG Medical Communication, 951-956.

Published Abstracts

- **Roels, R.**, Janssen, E. (2021). Affective and behavioral dimensions of sexuality and their relevance to relationship satisfaction: A multimethod study in young, heterosexual couples. *International Journal of Sexual Health*.
- **Roels, R.**, Mechelmans, D.J., & Janssen, E. (2019). Sexual frequency and relationship outcomes in young, heterosexual couples: The role of attachment style and sexual similarity. *International Journal of Sexual Health: vol. 31,* (A209-A210).

LIST OF PRESENTATIONS

Oral Presentations

International Meetings

- **Roels, R.,** Rehman, U. S., Carter, C. S., Nazarloo, H. P., Janssen, E. (2021). *Neurophysiological involvement in sexual communication: Peripheral oxytocin levels are associated with validating behaviors during sexual couple discussions*. Oral presentation presented at the Annual Conference of The Society for the Scientific Study of Sexuality (SSSS), San Juan, Puerto Rico, November 2021.
- **Roels, R.**, Janssen, E. (2021). *Affective and behavioral dimensions of sexuality and their relevance to relationship satisfaction: A multimethod study in young, heterosexual couples*. Oral presentation presented at the 25th Congress of the World Association of Sexual Health, held virtually due to COVID-19, September.
- **Roels, R.,** & Janssen, E. (2021). *When 2 become 1: The influence of attachment styles on the importance of sexual frequency in the early stages of romantic relationships*. Oral presentation presented at the International Association of Relationship Research (IARR) Conference, London, UK, July 2021.
- **Roels, R.** (2021). *"Het zit in ons bloed": Oxytocine en seksuele communicatie in koppels*. In Janssen, E. (Symposium chair), Seks in relaties. Oral presentation presented at the 23rd Dutch-Flemish IGO Doelencongres, Rotterdam, the Netherlands, March.
- **Roels, R.,** Rehman, U. S., Goodnight, J. A., Mechelmans, D. J., & Janssen, E. (2020). *Couple communication behaviors during sexual and nonsexual discussions: A window to relationship satisfaction*. Brief communication presented at the International Academy of Sex Research (IASR), (Virtual Annual Meeting), July.
- **Roels, R.**, Mechelmans, D.J., & Janssen, E. (2019). *Sexual frequency and relationship outcomes in young, heterosexual couples: The role of attachment style and sexual similarity*. Paper presented at the 24th World Congress for Sexual Health of the World Association for Sexual Health (WAS), Mexico City, Mexico. October.
- **Roels, R.**, & Janssen, E. (2017). *Het hypofysaire hormoon oxytocine: Nieuwe speler in het seksuele veld?* Paper presented at the 21st Dutch-Flemish Doelen Congress on Infertility, Gynecology, and Obstetrics, Rotterdam, the Netherlands. April.

National Meetings and Seminars

- **Roels, R.** (2021). *Onder de lakens van verbinding: Hechting en seks in koppelrelaties*. In Enzlin, P. (Symposium chair), Seksualiteit in koppelrelaties. Oral presentation presented at the 10th Vlaams Geestelijke Gezondheidszorgcongres, Antwerpen, Belgium, February.
- **Roels, R.**, Janssen, E. (2019). *Affective and behavioral dimensions of sexuality and their relevance to relationship quality: A longitudinal study*. Oral presentation presented at Dag van de Wetenschap, Insitute for Family and Sexuality Studies. Leuven, Belgium. November.
- **Roels, R.**, Janssen, E. (2019). *Does sex really matter? The relative importance of sexual communication and sexual frequency in young, heterosexual couples*. Psychiatry Research Seminar. UPC KU Leuven, Belgium. November.
- **Roels, R.**, & Janssen, E. (2019). *Sexuality in romantic relationships: A longitudinal study*. Video presentation. DOC's Day, Patient Related and Public Health Research, KU Leuven, Leuven, Belgium. September. ***Awarded best videocast of the year.***
- **Roels, R.** (2018). *Sexuality, relationship quality, and health: A longitudinal study*. Research seminar presented as a progress report in year 2 of the PhD training of Biomedical Sciences, KU Leuven, Belgium, November.
- **Roels, R.**, Janssen, E. (2018). *Affective and behavioral dimensions of sexuality and their relevance to relationship quality and health: A longitudinal study*. Oral presentation presented at DOC's Day, Patient Related and Public Health Research, KU Leuven, Leuven, Belgium. September.
- **Roels, R.** (2017). *Sexuality, relationship quality, and health: A longitudinal study*. Oral presentation as part of the evaluation moment of the PhD training of Biomedical Sciences, KU Leuven, Belgium, June.
- **Roels, R.**, & Janssen, E. (2016). *Affective and behavioral dimensions of sexuality and their relevance to relationship quality and health: A longitudinal study*. Psychiatry Research Seminar. UPC KU Leuven, Belgium. November.

Poster Presentations

- **Roels, R.**, Mechelmans, D., & Janssen, E. (2019). *Sexual and relationship satisfaction: The relative importance of sexual frequency and sexual communication*. Poster presented at the International Academy of Sex Research (IASR), Mexico City, Mexico, July.
- Mechelmans, D. J., **Roels, R.**, & Janssen, E. (2018). *What's love got to do with it: The relationships among sexual excitation and inhibition, attachment, and*

passionate love in young, heterosexual couples. Poster presented at the Annual Meeting of the International Academy of Sex Research (IASR), Madrid, Spain, July.

- **Roels, R.**, Mechelmans, D. J., & Janssen, E. (2018). *Couple similarity in attachment styles and sexual and relationship satisfaction in a young, heterosexual sample*. Poster presented at the Annual Meeting of the International Academy of Sex Research (IASR), Madrid, Spain, July.
- **Roels, R.**, Mechelmans, D.J., van Oudenhove, L., & Janssen, E. (2017). *Sexuality, relationships, and health: Design and aims of a three-year longitudinal study in young, heterosexual couples*. Poster presented at the Annual Meeting of the International Academy of Sex Research (IASR), Charleston, South Carolina, USA, July.

Press Coverage

- The Academic Times, US, 26/05/2021: *Do you understand your partner's sexual needs? You may have higher levels of the 'love hormone'*
- Het Nieuwsblad, Belgium, 02/09/2020: *New study: in good couples, 'talking about sex' is more important than how much you do it* (article in Dutch: *"Nieuwe studie: bij goeie koppels is 'praten over seks' belangrijker dan hoeveel je het doet"*)
- Daily Mail, UK, 01/09/2020: *People who tell their partners what they want in bed are more likely to be satisfied with their relationships than those who just have lots of sex, study shows*

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Mijn familie wil ik bedanken voor hun onvoorwaardelijke liefde en steun. Mam en pap, bedankt voor alle kansen die jullie me gaven en blijven geven. Naast vele andere zaken leerden jullie me doorzettingsvermogen en eigenwaarde. Bedankt dat jullie me lieten groeien zoals het leven me leidde. Ellen en Giovanni, Karen en Zap, Lynn en Peter, bedankt om steeds interesse te kunnen veinzen in mijn onderzoeksgebied en voor de nuchtere *reality checks*. Lena en Marisa, Mona en Zjef, en Lucy, merci dat ik jullie nonkel mag zijn!

Tot slot, als deze doctoraatsperiode me iets heeft opgeleverd naast die drie letters achter mijn naam, dan is het wel dat ik mijn beste vriend en partner mocht ontmoeten. Koen, zonder jou was dit nooit gelukt, dat is zeker. Ik mag dan wel de therapeut zijn op het werk, maar jij was dat de voorbije jaren voor mij in huis. Naast kok, boekhouder, chauffeur en stijladviseur natuurlijk. Je zegt vaak dat geduld niet jouw sterkste kant is. Ik ga dat hier vandaag ook niet tegenspreken. Maar ik ben je wel ontzettend dankbaar voor wat je allemaal geduld hebt van mij de voorbije jaren en specifiek ook de laatste periode. Tot op de dag van vandaag voelt niets beter dan al dat denken, praten en schrijven over relaties in de praktijk te mogen omzetten met jou.

ABOUT THE COVER

I would like to end where I began: I always wanted to be a film director. Storytelling through the art of filmmaking. My doctoral thesis addresses this desire from a different angle: storytelling through the art of science. Before I began this scientific journey, I was convinced that if I ever aspired a PhD training, it should be one that focused on a down-to-earth topic, which would have to be understandable and relatable to a wider audience. However, the more I talked about my project with friends or colleagues, the more I became bemused: As diverse and ubiquitous as sexuality is, so are the opinions about (studying) it. It became clear that sexuality doesn't need much to spark a very differentiated and polyphonic discussion. Perhaps fortunately so. However, this also forced me to abandon the illusion of grasping "the bigger picture" and encouraged me to practice in finetuning and accepting the limitations of my research. This was a process marked with disconnection and reconnection.

Leonardo Van Dijl, both friend and film director, is no stranger to the collision of creativity and hardships and helped me make abstraction of this process. To capture this journey of disintegration and reintegration, Leo granted permission to use one of his photo collages. In a way, his collages resemble totem poles: monuments representing and commemorating ancestry, history, people or events. In this case, the totem pole represents the past years of my searching: Sometimes clueless, oftentimes enthused, but always wondering. Through this, I have developed newfound kinship, on a personal and professional level, for which I will always be grateful. I'm putting a 'full stop' at the end of this page, but what precedes it, is not the final word. I sincerely hope that my endeavors will inspire other researchers (or lovers) to enter or start the conversation about intimacy and relationships.

"I ask you, dear sir, to have patience with all that is unresolved in your heart and to try to love the questions themselves, like closed rooms, like books written in a foreign language. Don't try to find the answers now. They cannot be given anyway, because you would not be able to live them. For everything is to be lived. Live the questions now. Perhaps you then may gradually, without noticing, one day in the future live into the answers."

Rainer Maria Rilke