

# **The regulation of psychological distance in long-distance relationships**

## **D i s s e r t a t i o n**

zur Erlangung des akademischen Grades

doctor rerum naturalium (Dr. rer. nat.)

im Fach Psychologie

eingereicht an der

Mathematisch-Naturwissenschaftlichen Fakultät II

der Humboldt-Universität zu Berlin

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eingereicht: 12. Mai 2010

Datum der Disputation: 16.07.2010



**LOVE KNOWS NOT ITS OWN DEPTH UNTIL THE HOUR OF SEPARATION.**

**-Khalil Gibran**



## Acknowledgements

First and foremost, I would like to thank Prof. Dr. Jens B. Asendorpf, my advisor and first reader of this dissertation, for inviting me to work with him at the Humboldt-Universität zu Berlin. His excellent, unbeatably fast and consistent feedback and ideas guided me through all stages of this dissertation, and the creativity and flexibility in his thinking created an inspiring and challenging working environment.

I am also very grateful to the International Max Planck Research School LIFE for allowing me to generate this dissertation in a stimulating, interdisciplinary, and supportive working environment. I would like to thank the directors of the LIFE research school as well as the coordinators for their faithful and committed efforts, especially Imke Kruse, who found an answer to every question, and a solution for every problem.

I shared many precious and helpful moments with the people I met through LIFE, such as Tabea Reuter, Karen Bartling, and Annette Brose, who I would like to thank for their warmth, honesty and optimism.

I am also indebted to my co-workers, especially Wiebke Neberich, for her sharp mind, ideas, and support, as well as Konrad Schnabel, who, with his genuine kindness and enthusiasm, always put a smile on my face. My gratitude also goes to Jutta Katzer and Harald Schneider, who helped me out several times when I thought of something last minute.

I would also like to express my gratitude to the dissertation committee, Ursula Hess for being the head of the committee, and Jens B. Asendorpf, Hans-Werner Bierhoff, and Brooke C. Feeney for writing a review of my dissertation.

Another thank you goes to my two diploma thesis students, Hanna Endriss and Regina Hinzen, who did not hesitate to ask any question that was on their minds and hearts. You reminded me of my first ideas that I had when starting this project and helped me focus.

Also, I am very grateful to Tobi and Marcus for crash coursing the secrets of HTML with me, Alexei for sending good thoughts and programming help from Hamburg, and Kathrin, who tried to make me fluent in PHP and SQL in the shortest amount of time with endless patience, resistance for error messages, and scientific ambition.

I wish to thank my friends for being there no matter what happened, for listening, reading, writing, and waiting for phone calls, mails, or me in person. Thank you Jule and Oli for making me feel so very home whenever we meet, to Josi and Jens for making things easy when

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they are not, to Janina, Johanna, Cathy, and Anna for being amazingly supportive and compassionate, to Lisa and Malice for baby sitting, dishwashing, grocery shopping, and for making me laugh and see the world in a different light, to Marie for thinking along more than possible, and to Christoph, Thomas, and Micha for walking by my side through the years.

Thank you to my entire family, distant or not, for supporting and believing in me. I am deeply grateful to my parents and grandparents for believing that what I did was important, for lifting me up and calming me down, and for being an unconditional source of love and understanding at all times. I would like to especially thank my brother Dennis along with Suse for helping me think and breathe when I thought I couldn't, for letting me rob their fridge and coffee and leave a mess on their dinner table.

Finally, I would like to thank my little Marley for being a blessing in my life, reminding me of what matters, and stopping time for me when I thought there wasn't any.

And thank you, Jose, for believing and showing me that love can overcome any distance, may it be of inner or outer nature, and making me more sensitive, aware, and stronger than I ever thought I could be.

## Abstract

This dissertation explored adaptive processes that reflect and regulate psychological distance in long-distance relationships (LDRs). It proposed how relationship quality and stability is maintained without physical presence of the partner by basing many compensatory processes on perceived partner availability, a core component of attachment theory (Bowlby, 1969/1980). In manuscript I, LDRs indicated more attachment anxiety and less avoidance than proximal relationships (PRs). Anxiety was found to be associated with contextual factors in LDRs, and slightly increased for individuals still in LDRs one year later. Anxiety tended to be somewhat less detrimental to relationship satisfaction in PRs, and avoidance less detrimental in LDRs. In manuscript II, the two communicative behaviors shared everyday decisions (SHARED) and constructive communication partially and differentially mediated the association between the attachment orientations anxiety and avoidance and relationship satisfaction and commitment. SHARED, but not constructive communication predicted relationship stability over and above the attachment orientations and relationship length. In manuscript III, sexual satisfaction in LDRs could be conceptualized as a mutual-influence model. In both a couple and individual sample, sexual difficulties during visits and relationship satisfaction were found to be its most influential predictors. The link between relationship satisfaction and sexual satisfaction was weaker for highly anxious than for low anxious, and weaker for women than for men. The findings indicate that while partners are rather independent from one another in LDRs, heightened anxiety reflects the inconsistent partner availability, and is less detrimental to relationship development than avoidance. Attachment further regulated the psychological distance between partners by influencing adaptive and protective communicative processes. There was indication that when relational aspects, such as sexual satisfaction, cannot be compensated for, LDRs base their evaluation on face-to-face experiences and general relationship quality indicators.

Keywords:

long-distance relationship, attachment, relationship satisfaction, relationship dynamics

## **Zusammenfassung**

Diese Dissertation untersuchte individuelle Anpassungsprozesse, die psychologische Distanz in Fernbeziehungen (FB) reflektieren und regulieren. Es wurde postuliert, dass Beziehungsqualität und -stabilität ohne Präsenz des Partners gesichert wird, indem viele kompensatorischen Prozesse auf die wahrgenommene Verfügbarkeit des Partners (Bowlby, 1969/1980), abzielen. In Manuskript I gaben FBs mehr Bindungsängstlichkeit an als Zusammenwohnende (ZW), obwohl diese für FBs mit niedrigerer Beziehungszufriedenheit einherging als für ZWs. Vermeidung dagegen war bei ZWs erhöht und ging dort mit niedrigerer Beziehungszufriedenheit einher als in FBs. Bindungsängstlichkeit war mit Kontextfaktoren der FB assoziiert, und stieg für Personen, die nach einem Jahr noch immer in einer FB waren, leicht an. In Manuskript II mediieren gemeinsame Entscheidungsprozesse (SHARED) und konstruktive Kommunikation in Konfliktsituationen partiell und differenziell den Zusammenhang zwischen Bindung und Beziehungsqualität. SHARED sagte darüber hinaus auch nach Kontrolle von Beziehungslänge und Bindung die Stabilität der Beziehung vorher. In Manuskript III konnte sexuelle Zufriedenheit in FBs als ein mutual-influence model dargestellt werden. Sowohl in einer Individual- als auch einer Paarstichprobe waren sexuelle Schwierigkeiten beim Sehen and Beziehungszufriedenheit die einflussreichsten Prädiktoren. Die Assoziation zwischen Beziehungszufriedenheit und sexueller Zufriedenheit war schwächer für Hoch-, als für Niedrigängstliche, und schwächer für Frauen als für Männer. Die Ergebnisse zeigen dass, obwohl FB Partner relativ unabhängig voneinander sind, erhöhte Bindungsängstlichkeit die inkonsistente Verfügbarkeit des Partners reflektiert, und insgesamt für die Beziehungsentwicklung weniger schädlich ist als Vermeidung. Bindung reguliert ferner die psychologische Distanz durch den Einfluss auf adaptive Kommunikationsprozesse. Wenn Aspekte wie sexuelle Zufriedenheit nicht kompensiert werden können, scheinen FBs ihre Einschätzung stark auf Momente des Sehens und die Beziehungsqualität zurückzuführen.

Schlagwörter:

Fernbeziehung, Bindung, Beziehungszufriedenheit, Beziehungsdynamik



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# Chapter 1

## Introduction

### Overview

Long-distance relationships (LDRs) are becoming a rapidly increasing type of partnership in Western cultures. In 2005, almost 3% of all US marriages were LDRs, marking a 23% upswing in only 5 years from 2.36% in 2000 to 2.9% in 2005 (Guldner, 2003). For premarital romantic relationships, estimates range from 20-40% for US college students (Guldner, 2003), posing a striking number of relationships that are not in the conventional form typically studied by relationship researchers. Accordingly, interest in the characteristics of long-distance romantic relationships and related indicators of relationship functioning has risen in the past two decades. As LDRs have been recognized to incorporate premises different from those in proximal relationships (PRs), typically studies have focused on the comparison of LDRs with PRs pertaining to relationship outcomes such as relationship satisfaction (Guldner & Swensen, 1995; Stafford & Reske, 1990; Van Horn et al. 1997), commitment (e.g., Baxter & Bullis, 1986; Dellman-Jenkins, Bernard-Paolucci, & Rushing, 1994), and stability (Stafford & Merolla, 2007; Stephen, 1986; Van Horn et al., 1997). Generally, these comparisons could show that LDRs resemble PRs more than they differ from them regarding relationship outcomes.

However, to date we do not have much insight into the processes in LDRs that lead to the comparable outcomes and compensate for missing aspects of daily relationship life commonly assumed to be crucial for relationship maintenance and development, such as the role of everyday face-to-face talk (e.g., Duck & Pittman, 1994) or of the importance of physical closeness (see Harvey, Wenzel, & Sprecher, 2004).

The aim of this dissertation was to explore adaptive processes that reflect and regulate psychological distance between LDR partners, and clarify individual differences in these processes. The underlying assumption guiding this research was that the concept of perceived partner availability, a core component of attachment theory (Bowlby, 1969/1980) is central to many compensatory processes in LDRs and motivates the partners' behavioral strategies.

## Psychological distance

The most obvious feature that distinguishes long-distance relationships from proximal relationships is the physical distance between the partners which implies that the relationship is characterized by the habitual absence of the partner. Construal Level Theory (CLT; Liberman & Trope, 2008; Liberman, Trope & Stephan, 2007; Trope & Liberman, 2003) assumes that a stimulus i.e., a person or an event, is psychologically distant when it is not part of one's direct experience of oneself, here, and now. The authors state that the greater the spatial, temporal, or social distance from the stimulus, the greater the perceived psychological distance. From the standpoint of an individual in a LDR, this implicates that the partner who is commonly absent due to the spatial distance should be perceived as psychologically distant. The theory further specifies that the perceived psychological distance can be *reflected* as well as *regulated* by certain behavioral strategies. One example is the theory of politeness (Brown & Levinson, 1987), where politeness is conceptualized as a means of reflecting social distance (e.g., a speaker addressing a colleague politely to *reflect* the interpersonal distance between them) as well as regulating social distance (addressing the colleague politely to *increase* the interpersonal distance). In the present work, this idea is transferred to the theory of attachment (Bowlby, 1969/1980), where attachment is conceptualized as a means to both *reflect* psychological distance between LDR partners, as well as a means to *regulate* psychological distance.

## Attachment and separation

From the three major behavioral systems that have been recognized in adult romantic relationships, namely attachment, caregiving, and sexuality (Shaver, Hazan, & Bradshaw, 1988), one specifically addresses issues of proximity and separation between romantic relationship partners. Attachment was first described as a “lasting psychological connectedness between human beings” (Bowlby, 1969, p. 194) referring to the infant-caregiver bond, and was later applied to adult romantic relationships (Hazan & Shaver, 1987). An attachment figure, which likely is the romantic partner in adulthood, is characterized as a target for *proximity seeking* and proximity maintenance. Central to attachment theory are also the conceptualizations of the attachment partner as a physical and emotional *safe haven* that offers comfort, support, and reassurance, i.e., a source of distress alleviation, and a *secure base*, which provides the security to engage in activities unrelated to attachment. Bowlby (1973) proposed that encountering stress automatically activates the attachment system, and manifests in thoughts and behaviors directed at proximity seeking. Notably, stressors can be both threats to the relationship (e.g., Fraley & Shaver, 1998) and events that are not directly related to the disruption of



attachment bonds, such as personally threatening, challenging, or conflictual situations (Kobak & Duemmler, 1994). Partners that are available, responsive, and sensitive in times of need facilitate a sense of attachment security, implicating that autonomous functioning is gained by the ability to depend on someone when needed (Feeney, 2010). Unavailable or unresponsive attachment partners, however, fail to relieve distress and attachment security cannot be established (Mikulincer, Shaver, & Pereg, 2003).

The availability of the attachment partner can therefore be considered the fundamental prerequisite for attachment security. In fact, separations from romantic partners have been shown to cause distress, as indicated by both physiological and self-report measures (Cafferty, Davis, Medway, O'Hearn, & Chappell, 1994; Feeney & Kirkpatrick, 1996), and attempts to re-establish physical proximity (Fraley & Shaver, 1998; Vormbrock, 1993). Of course, this is not always possible as in the case of LDRs. However, when a partner is absent, the attachment system is still activated in stressful situations and linked to proximity seeking of the partner. Mikulincer, Birnbaum, Woddis, and Nachmias (2000) found that when proximity seeking during stress is inhibited due to the absence of the partner, the accessibility of proximity related thoughts and behaviors is heightened. Similarly, Mikulincer, Gillath, and Shaver (2002) found that a stress induction heightened the accessibility of an attachment partner's name, but not the name of other people.

In summary, research has shown that the separation from an attachment partner is perceived as a threat to the attachment bond, experienced as stressful, and initiates proximity seeking behaviors. Importantly, this is done independently of whether the separation can be ended or not. Along the same lines, proximity seeking is activated in generally stressful conditions, independent of whether the partner is physically present or not. As Fraley and Shaver (1998) note, the attachment system is designed to activate proximity maintenance behaviors, but not to discriminate between situations in which attachment behavior is likely to establish or re-establish proximity and those where it is unlikely or impossible.

### **Attachment in long-distance relationships**

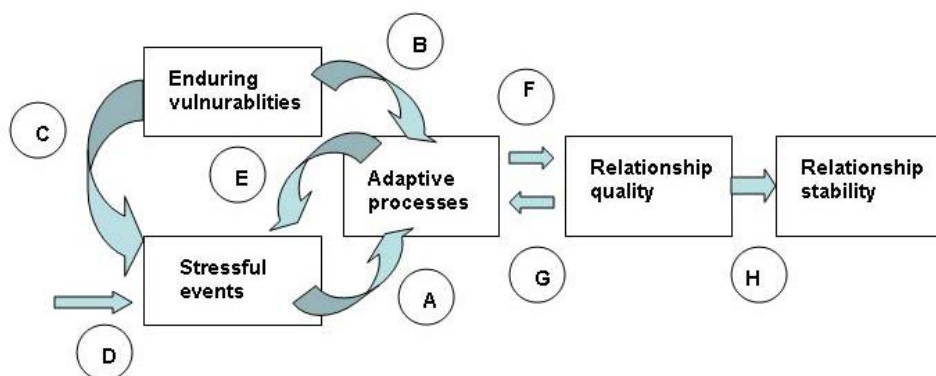
For LDRs, this suggests (1) that despite the knowledge that physical distance is a central feature of the relationship and that physical proximity cannot be established upon wish, the separation should be perceived as a threat to the relationship and cause distress. It suggests (2) that although the partner is not physically present, otherwise stressful situations will still elicit proximity related thoughts and behaviors to him or her.

Now, although separations are stressful, it is assumed that in adulthood the perception of partner availability is more crucial than physical proximity and can partly replace it (Shaver & Mikulincer, 2002). Consequently, besides turning to internalized representations (Mikulincer, Shaver, & Pereg, 2003), LDR partners should try to establish and maintain perceived partner availability by other means, e.g., by mobile communication. In fact, Döring and Dietmar (2003) could show that LDRs do exactly that in attachment situations.

Although in proximal relationships this is also done (e.g., calling a partner for assurance shortly before an important meeting), in LDRs the maintenance of perceived availability should be crucial to relationship functioning as it cannot be compensated by physical proximity. The behavioral strategies that LDRs develop for this purpose can hence be thought of as adaptive processes that are central to relationship quality.

This line of reasoning can be demonstrated using Karney's and Bradbury's vulnerability-stress-adaptation model (1995, see Figure 1-1). The model assumes that stressful life events influence adaptive processes in romantic relationships (A), where the processes again are proximal causes of relationship quality and stability (F & H). The model specifies two feedback loops indicating that the adaptive processes are also influenced by relationship quality itself (G), and in turn influence the perception of the stressful events (E). For LDRs, this could mean that adaptive processes which successfully (in terms of relationship quality) compensate for the stressful relationship situation by ensuring perceived partner availability also decrease the perception of the LDR as being stressful.

**Figure 1. A vulnerability-stress-adaptation model of marriage**



**Source: Karney and Bradbury, 1995.**

**Figure 1-1: A vulnerability-stress-adaptation model of marriage, Source: Karney and Bradbury, 1995**

The model also introduces enduring vulnerabilities, which are thought to be individual personality traits of the partners that influence both the experience of potentially stressful events (C) and the adaptive processes (B). In short, the model suggests that adaptive processes are generated as a function of both characteristics of the situation and characteristics of the individual and directly relate to relational outcomes such as relationship satisfaction and stability. It has been proposed earlier that the characteristics of the LDR situation should direct the adaptive processes at ensuring perceived partner availability and thereby reduce psychological distance. For characteristics of the individual, the two dimensions of attachment that have been shown to be differentially related both to the perception of and reaction to stressful events and to affect regulation will be examined.

### **Attachment anxiety and avoidance**

The integrative process model of attachment (Shaver & Mikulincer, 2002) states that while attachment system activation in a first step leads to proximity seeking as the *primary attachment strategy*, perceived unavailability or a lack of responsiveness of the attachment partner leads to one of the two *secondary attachment strategies*. Hyperactivating strategies are employed if continued proximity seeking is evaluated as potentially rewarding, and deactivating strategies when it is not. Hyperactivating strategies are characterized by a chronic activation of the attachment system, whereas deactivating strategies are characterized by keeping the attachment system under control. The decision made here is responsible for the development of individual differences in attachment anxiety (hyperactivation) and attachment avoidance (deactivation) over time. As Shaver and Mikulincer (2002) note, partner availability is therefore one of the main sources of variation in strategies in affect regulation.

Anxiety is characterized by a striving for intense closeness, rumination about relationship threatening issues, and clingy behavior (e.g., Mikulincer, Orbach, & Iavnieli, 1998). This pattern of behavior is linked to the experience of inconsistent partner availability with reinforcing moments of felt attachment security upon proximity seeking.

Avoidance, in contrast, is characterized by minimized proximity seeking, emotional distancing, and heavy self-reliance (Carpenter & Kirkpatrick, 1996; Simpson & Rholes, 1994; Mikulincer & Florian, 1998). It is linked to the experience that proximity seeking is consistently unsuccessful, ignored, or punished.

Going back to the vulnerability-stress-adaptation model, anxiety and avoidance are related to differential perceptions of and reactions to stressful situations in that anxiety hyperactivates and avoidance deactivates the attachment system. They are also differentially related to adap-

tive, i.e., affect regulation processes in that anxiety aims at maximizing proximity and avoidance at minimizing proximity. Both anxiety and avoidance have further been shown to be strongly related to relationship quality (e.g., Mikulincer & Shaver, 2007).

## **Parts of the dissertation**

The three manuscripts that are part of this dissertation aimed at exploring the role of the stressor, i.e., the characteristics of the LDR situation, as well as attachment, i.e., characteristics of the individual, for both the adaptive processes and relationship outcomes.

Manuscript I entitled “Attachment anxiety and avoidance in different relationship types: A comparison of long-distance and proximal relationships” examined whether the secondary strategies anxiety and avoidance differed depending on relationship type by contrasting a LDR with a PR sample. It was also explored whether differences in anxiety and avoidance had differential effects on relationship quality depending on relationship type. This manuscript hence addressed the assumption that the specific characteristics of the LDR situation are related to an affect regulation strategy aimed at reducing psychological distance by ensuring perceived availability of the partner, and addressed how this strategy relates to the quality of the relationship.

Manuscript II entitled “Shared everyday decisions and constructive communication:

Protective factors in long-distance romantic relationships” is based on the findings from manuscript I indicating that people try to establish partner availability when not given. It examined adaptive communicative behaviors that have the potential to facilitate perceived partner availability and decrease psychological distance over and above specific interactions. It was investigated how individual differences in attachment anxiety and avoidance relate to the communicative behaviors and relationship satisfaction, commitment, and stability.

Manuscript III entitled “Sexual satisfaction in long-distance relationship couples:

A mutual influence model” explored predictors of sexual satisfaction in LDRs and addressed how aspects of relationship quality that can hardly be compensated for are dealt with. It contrasted the influence of predictors related to quantity and quality of sexual interactions with the influence of attachment and relationship satisfaction, and raised the question whether the degree of interdependence between partners reflects characteristics of the LDR situation.

## Sample

All three manuscripts are based on the same sample that the author of this dissertation recruited by a nationwide press release published in Germany. It encouraged LDR individuals and couples via newspaper advertisements, radio announcements, and online blogs to participate. This strategy ensured getting a sample with a great variety in regional diversity, age and relationship experience. Both LDR individuals and couples completed the study online through the website of the Department of Psychology of Humboldt University Berlin, Germany. The participants were contacted via email one year after the initial assessment and asked to fill out another short follow-up questionnaire online.

Participants were required to (a) be at least 18 years old, (b) indicate to have a partner of the other sex, and (c) have no missings on all central variables. For the couple sample, both partners had to participate, and both partner's entries had to fulfill these inclusion criteria. Regarding individuals, this left 971 from originally 1353 participants, and for the couple sample, 75 from originally 114 couples were left in the participant pool. Individuals and couples were analyzed separately.

Manuscripts I and II contain data from individuals only, whereas manuscript III addresses both individuals and couples. As outlined above, the manuscripts differ in terms of the research questions asked.

In addition, the comparison of LDRs and PRs in manuscript I also includes 278 individuals from a sample of proximal relationships. Wiebke Neberich, who is also a coauthor of this paper, developed the respective questionnaire and recruited the sample as part of her own dissertation research and a project of the German Research Foundation.

The subsample used here completed a questionnaire paralleled to the one used in the LDR sample and is therefore directly comparable. The PR sample was recruited by a press release just like the LDR sample, and participants also completed the study online through the website of the Department of Psychology of Humboldt University Berlin.

## LDR definition

As the literature has not yet agreed on a LDR definition, the one used in all three studies was a self-generated one and included two criteria: (1) that LDRs had to have two separate households and (2) that LDR partners would have difficulty visiting the partner and returning back to their own residence in one day. (1) was chosen to explicitly address LDRs and avoid confounding them with commuters, whose lifestyle might have different implications for their

relationships (Anderson & Spruill, 1993; Bunker, Zubek, Vanderslice & Rice, 1992). Commuters commonly have one main household, are older than LDRs on average, and more often have founded a family already. LDRs, in contrast, are typically rather young, mostly in their educational or early career stages, and have not founded a family yet (e.g., Schneider, Limmer & Ruckdeschel, 2002/2003). (2) was developed in reference to Dellman-Jenkins, Bernard-Paolucci, and Rushing (1994), who first defined LDRs with the time criterion “could not see their partner every day if desired”. Importantly, this criterion was meant to address the physical distance between the partners with implications for the degree of psychological distance and physical unavailability in terms of attachment theory. The slightly altered definition used here takes relativity of distance depending on usual means of travel into account.

## Summary of findings

*Manuscript I.* The main findings from this study were that while relationship satisfaction did not differ between LDRs and PRs and was unrelated to contextual factors in LDRs, long-distance partners indicated more attachment anxiety and less avoidance than PRs. Anxiety was found to be associated with contextual factors in LDRs, such that it was higher for shorter relationships, shorter travel times, and fewer visits, and was found to slightly increase for individuals still in LDRs one year later. In terms of relationship satisfaction, anxiety tended to be somewhat less detrimental in PRs, whereas avoidance was found to be less detrimental in LDRs. For all, effects of sex, age and relationship length were considered.

*Manuscript II.* The second study found that the two communicative behaviors shared everyday decisions (SHARED) and constructive communication during conflicts partially and differentially mediate the association between the attachment orientations anxiety and avoidance and the two investigated outcomes relationship satisfaction and commitment. While SHARED was more strongly linked to commitment than to relationship satisfaction, the reverse was found for constructive communication. SHARED, but not constructive communication predicted relationship stability over and above the attachment orientations when relationship length was controlled for.

*Manuscript III.* The third study found actor effects of relationship satisfaction and sexual difficulties during visits to be the only significant predictors of sexual satisfaction in the LDR couple sample. No significant partner effects emerged, indicating that the model is better conceptualized as a mutual-influence model (Kenny, 1996), with influence among partners on the outcome variable only. In the much larger sample of individuals, sex drive, sex with the partner during separation, and frequency of visits also predicted sexual satisfaction together with

attachment anxiety and avoidance, although the association was small for all. Anxiety was found to moderate between relationship satisfaction and sexual satisfaction, such that the link was weaker for highly anxious and stronger for low anxious individuals in LDRs. In both samples, the link between relationship satisfaction and sexual satisfaction was also weaker for women than for men.

## General Discussion

The findings presented in this dissertation support the basic assumption presented at the beginning of this work which stated that attachment is a useful framework for investigating LDRs because it both reflects and regulates the psychological distance between partners. In manuscript I, it could be shown that attachment *reflects the psychological distance* between LDR partners by pursuing anxiety rather than avoidance as a secondary strategy, which is characterized by a strong wish for closeness and continued efforts to establish proximity and ensure availability of the partner. Attachment theory suggests that inconsistent partner availability with both moments of unsuccessful as well as successful proximity seeking leads to anxiety as a secondary strategy. The characteristics of the LDR situation where contact depends on times zones, communication devices, internet etc., do provide exactly that. Importantly, this is independent of whether the partner would like to be available, attentive, and responsive. The elevated anxiety level in LDRs also supports and explains results in other studies that found that a problem in LDRs is the insecurity regarding the reliability and continuity of the relationship (e.g., Van Horn et al, 1997; Vormbrock, 1993).

It is therefore interesting to look at the implications that anxiety has for relationship quality and relationship development, respectively. With regard to relationship quality, in manuscript I it was related to lower relationship satisfaction in LDRs than in PRs. Although this does not make anxiety look like a beneficial adaptive strategy in the first place, manuscript II found that it was only marginally negatively related to relationship stability whereas avoidance has a strong negative influence.

These findings indicate that while anxiety is still an insecure strategy that has drawbacks regarding one's own relationship satisfaction (we did not assess how it affects the partner, which could be different), it might be the better secondary strategy in terms of a positive relationship development. From the two secondary strategies anxiety is the more optimistic one in terms of re-establishing availability and consequently the more proximity-motivated strategy. This notion was supported by the positive link found between anxiety and commitment in

manuscript II. Notably, it has also recently been found that commitment can successfully buffer the negative effects of anxiety (Tran & Simpson, 2009).

The findings concerning avoidance are in line with this result. It was found to be very detrimental for PRs' relationship satisfaction in manuscript I, and also detrimental to relationship stability in LDRs in manuscript II. As suggested in manuscript I, for one's own relationship satisfaction it might not be as detrimental because autonomy and self-reliance are part of the LDR lifestyle. Although we did not assess how it affects the partner's relationship satisfaction, the limited self-disclosure and emotional distancing tendency characteristic of avoidance are likely a problem; not for the avoidant individual, but for the partner, thereby leading a negative relationship development.

After showing in manuscript I that people try to establish partner availability when not present, the findings in manuscript II suggested that attachment also *regulates the psychological distance* between LDR partners. With reference to the adaptive processes in Karney's and Bradbury's vulnerability-stress-adaptation model, attachment anxiety and avoidance could be shown to have a direct influence on the proposed communicative behaviors, as well as an indirect influence on relationship satisfaction and commitment. In terms of relationship development, especially SHARED was found to be a powerful protective behavior for commitment to the relationship and relationship stability. These results indicate that SHARED and constructive communication benefit relationship quality by facilitating perceived partner availability and decreasing psychological distance. As proposed, a large part of the regulation of psychological distance in LDRs can therefore be thought of as a function of the attachment system.

While manuscript I and II investigated how relationship quality is ensured both by the indirect influence of attachment and the direct influence of adaptive processes, manuscript III explored sexual satisfaction as another important aspect of relationship quality that was thought to be hard to compensate for. The results showed that evaluations of sexual satisfaction are mainly based on actual sexual interactions during visits rather than sexual experiences with the partner over the distance, indicating that sexual satisfaction is an aspect of relationship quality that is not compensated much in LDRs. Here, the only crucial sex differences in all of the manuscripts were found, suggesting that women are more sexually satisfied in LDRs than men and tend to rely on the quality of actual sexual encounters more than men, who also generalize from relationship satisfaction to a large extent.



While attachment anxiety and avoidance played only a minor role as predictors of sexual satisfaction; anxiety was found to be a moderator between relationship and sexual satisfaction, indicating that in LDRs anxiety contributes to a better distinction of relationship and sexual satisfaction. The reverse effect has been found for PRs (Butzer & Campbell, 2008). Possibly, this can help to avoid spillover effects from relationship satisfaction to sexual satisfaction and reverse for highly anxious individuals.

Lastly, the findings from manuscript III also suggested that the degree of interdependence between partners reflects characteristics of the LDR situation. Although the sexual satisfaction of one partner was found to be independent of the other partner's individual characteristic and experiences, there was mutual influence on the outcome itself. In other words, although partners in LDRs might not affect each other as much as partners in PRs, there is still feedback regarding the final evaluation of sexual satisfaction.

## **Conclusion**

This dissertation contributes to the literature in meaningful ways both theoretically and methodologically. First, the three manuscripts applied the theoretical framework of attachment to the novel domain of long-distance relationships, proposing processes of how relationship quality is ensured without physical presence of the partner. Second, in all three studies, a large population-based sample was used to address the research questions, which allowed explicit examination of confounds such as age and relationship length. In smaller and less varied samples, these variables are often not addressed at all or found to be non-significant due to homogenous and mostly very young samples. For both LDRs and PRs, it could be shown that the consideration of confounds, especially relationship length, is crucial for the study of romantic relationships. Third, the analysis of couple data allowed for insights regarding the interdependence of LDR partners.

In sum, this work advances our understanding of how situational and individual characteristics in relationships contribute to fundamental relationship processes and quality.

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## **Chapter 2**

# **Attachment anxiety and avoidance in different relationship types: A comparison of long-distance and proximal relationships**

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### **Abstract**

We investigated attachment orientations and relationship quality in long-distance relationships (LDRs) as compared to proximal relationships (PRs) in a population-based sample, and considered the role of age and relationship length for relationship processes. While relationship satisfaction did not differ between LDRs and PRs, LDR partners indicated more attachment anxiety and less avoidance than proximal partners. Attachment anxiety could be predicted from contextual factors in LDRs and slightly increased for individuals still in LDRs one year later. While anxiety tended to be somewhat less detrimental to relationship quality in PRs, avoidance was less detrimental in LDRs. For both LDRs and PRs, attachment anxiety depended on age and relationship length whereas for avoidance only age mattered. The results suggest that attachment orientations differ depending on type of partnership and have differential effects on relationship quality.

## **Attachment anxiety and avoidance in different relationship types: A comparison of long-distance and proximal relationships**

In the past two decades, relationship researchers have become interested in studying long-distance romantic relationships. Due to heightened mobility requirements in everyday life, they have become an increasingly common type of partnership in western cultures (Guldner, 2003). So far, mainly general indicators of relationship functioning have been addressed. Long-distance relationships (LDRs) have been shown to have about equal relationship satisfaction, commitment, and stability as PRs. So far, this suggests that LDRs resemble PRs more than they differ from them.

However, there is virtually no research about the role of individual differences in LDRs relevant for relationship processes and outcomes. As the attachment behavioral system is responsible for maintaining or reestablishing proximity to attachment figures when availability is not given (Bowlby, 1969), we suggest that differences in attachment orientations should play a crucial role in LDRs where physical and emotional availability of the partner is constantly at stake.

In the present article, we study partner-specific attachment orientations and relationship quality in a population-based LDR sample. In order to disentangle effects of attachment in both forms of partnership, we compare LDRs to proximal relationships (PRs). An emphasis is further given to age- and relationship length related processes that, to the best of our knowledge, have not been investigated in LDRs at all yet.

### **Relationship Quality in Long-distance Relationships**

It is one of the most consistent findings in LDR research that LDR partners are no more likely to end their relationships than PR partners. Several studies show that long distance couples have equal (Van Horn et al. 1997) or even lower breakup rates than PRs (Stafford & Merolla, 2007; Stephen, 1986) as long as the partners remain long-distance. Studies that have investigated commitment levels (e.g., Baxter & Bullis, 1986; Dellman-Jenkins, Bernard-Paolucci, & Rushing, 1994) found no significant differences between LDRs and PRs.

Regarding relationship satisfaction, the results are somewhat mixed. Guldner and Swensen (1995) found identical reports of relationship satisfaction in LDRs and PRs whereas Stafford and Reske (1990) reported that students involved in LDRs rated relationship satisfaction higher than students in non LDRs. In contrast, in a study by van Horn et al. (1997), LDRs

were rated as less satisfactory. The authors found that a variable assessing the reliability of the relationship was significantly lower in LDRs, and accounted for 74% of the variance in relationship satisfaction in both LDRs and PRs. Along the same lines, Helgeson (1994) found that about 66% of surveyed college students did not believe that an average LDR would last through an academic year.

These findings indicate that relational insecurity might constitute a crucial factor in determining the quality of LDRs. To our knowledge, so far only two studies have explicitly addressed this question with respect to stability in LDRs. Cameron and Ross (2007) found that lower levels of relational security (operationalized as relationship optimism) were associated with reduced relational stability. Similarly, Helgeson (1994) showed that positive, i.e., optimistic, relationship beliefs are associated with relationship maintenance but also with worse adjustment to physical separation and breakup, if they happened. It may simply be harder to trust a relationship when physical, emotional, and sexual availability of the partner is very limited by the relationship conditions.

Therefore a feeling of relational security might depend more heavily on contextual factors in LDRs (e.g., length of relationship, actual distance between partners, and frequency of visits) than it does in proximal relationships. However, Guldner and Swensen (1995) and Schwebel, Dunn, Moss, and Renner (1992) found no associations between geographical distance between the partners, length of separation, and frequency of visits with relationship satisfaction or stability.

### **Attachment in long-distance relationships**

Another approach that might help to clarify the role of relational insecurity in LDRs may be differences in attachment orientations. Since Hazan and Shaver's (1987) work about adult attachment in the context of romantic relationships, many researchers have explored partner attachment and related aspects of relationship quality (e.g., Kirkpatrick & Davis, 1994; Mikulincer & Shaver, 2003, 2007; Sümer & Cozzarelli, 2004). It is assumed that the partners fulfill the same functions that the primary attachment figure fulfills for a child: being a target for proximity-seeking, a secure base for exploration, and, in the face of threats, a safe haven (Bowlby, 1969). Romantic partners feel comforted when their partner is nearby and responsive, and they tend to feel anxious or lonely when their partner is unavailable. (Hazan & Shaver, 1987).

Our operationalization of individual differences in attachment is based on the work of Brennan, Clark, and Shaver (1998), who suggest two basic dimensions with respect to adult at-



tachment patterns, one being attachment-related anxiety, the other attachment-related avoidance. People who score high on the anxiety dimension tend to have a strong desire for closeness and protection, and worry about their partner being available, attentive and responsive, whereas individuals scoring high on the avoidance dimension prefer not to rely on or open up to their partner.

Of special relevance for the present study are the dynamics of attachment-related strategies as described by the integrative process model of attachment (Shaver & Mikulincer, 2002) which posits that the attachment system is activated in the face of threats and leads to the primary attachment strategy – proximity seeking. If the attachment figure is perceived to be unavailable, no attachment security can be reached and either anxiety (hyperactivation of the system when proximity seeking seems potentially rewarding) or avoidance (deactivation of the system when it does not) is chosen. Hyperactivating strategies are characterized by a chronic activation of the attachment system, whereas deactivating strategies are characterized by keeping the attachment system under control. This third component is responsible for the development of individual differences in attachment anxiety (hyperactivation) and attachment avoidance (deactivation) over time with their respective typical pattern of behavior.

Dispositional attachment orientations have been shown to be quite flexible, depending on both the specific partner (e.g., Asendorpf, Banse, Wilpers, & Neyer, 1997; Furman, Simon, Shaffer, & Bouchev, 2002) and also on the particular relationship context (Gillath & Shaver, 2007; Morgan & Shaver, 1999).

By definition, the long-distance situation is characterized by current partner unavailability in terms of physical proximity. Although nowadays the partner can still be reached by the means of communication devices more readily, partner availability is still very likely to be inconsistent because of the relationship circumstances. Importantly, this is independent of the partner's attachment orientation and his or her reaction to requests for availability. In the long run, the inconsistent availability should endanger the perception that the partner is a secure base for exploration and a safe haven in the face of threats.

If this is true, then LDRs and PRs should differ in the secondary strategy chosen when the partners are confronted with non-availability. We expect that PRs indicate more attachment avoidance, whereas LDRs are expected to show more attachment anxiety. Perceived unavailability of the partner in PRs is likely to be a result of repeated experiences with actual unavailability of the specific partner that is attributed to him or her, leading to a deactivation or avoidance tendency over time. In contrast, the inconsistent availability of the partner in LDRs

is likely to be attributed to the circumstances of the LDR relationship rather than to the partner. Moreover, LDR partners have been shown to idealize their partners more than PRs (Stafford & Merolla, 2007; Stafford & Reske, 1990), thereby promoting a positive partner image. This should enhance the perception of continued proximity seeking as a viable option among LDRs. Higher anxiety among LDRs would further help to explain the finding of higher relational insecurity among them, as anxious individuals tend to worry about their relationship and ruminate on relationship threatening issues.

With regard to relationship quality, it has consistently been shown that both high attachment avoidance and attachment anxiety are strong negative predictors of relationship satisfaction and stability in PRs (e.g., Feeney, 1999, Mikulincer & Shaver, 2007). In contrast, we assume distinct effects for anxiety and avoidance for relationship quality in the two types of partnership. We expect attachment anxiety to be more detrimental to LDRs than to PRs, while avoidance should not be as detrimental to LDRs as to PRs in terms of relationship satisfaction. While heightened attachment anxiety might be a reasonable response to the LDR situation in that it triggers continuous efforts to establish a connection and closeness to the partner, the constant rumination about relationship-threatening issues should have strong negative effects in LDRs where communication and monitoring of the partner is severely hindered and feedback about relationship specific topics often delayed or not existent. In PRs, partner monitoring is easier and less obvious, and evaluation of the relationship hence facilitated. This might alleviate some of the negative effects of anxiety on relationship satisfaction. On the other hand, characteristics of avoidant individuals are more in line with implications of a LDR as a lifestyle itself. The tendency for independence and self-reliance might be attributed to the relationship situation, thereby attenuating the negative effects of avoidance for LDRs. For PRs, attachment avoidance might contribute more to dissatisfaction with the relationship because the emotionally distanced behavior together with the limited self-disclosure typical for avoidance (Mikulincer, Florian, & Weller, 1993) are more likely to be attributed to the relationship itself, not to the relationship context.

In summary, we expect (1) individuals in LDRs to score higher in attachment related anxiety and individuals in PRs higher in attachment-related avoidance, and we assume (2) that anxiety is associated with lower relationship quality in LDRs, whereas avoidance is associated with lower relationship quality in PRs. Replicating earlier results, we also (3) do not expect associations between contextual factors (distance between partners, frequency of visits) and relationship quality in LDRs and (4) significant differences in overall relationship quality between LDRs and PRs.

Finally, our population-based sample allowed us to explore the role of relationship length and age for attachment related processes and relationship quality for both types of partnership. We included these exploratory analyses because the length of the relationship might contribute to more trust in the relationship reliability, thereby reducing relational insecurity. Further, relationship length has been shown to be associated with less attachment related behavior in attachment inducing situations (Fraley & Shaver, 1998), however leaving open whether this finding is not confounded with effects of age.

## Method

### Sample

Participants were recruited through a nationwide press release in Germany to ensure a great variety in age and relationship experience. Both individuals in LDRs and PRs were directed at separate but paralleled online questionnaires that could be entered through the online portal of the Department of Psychology of Humboldt University Berlin, Germany. Individuals in LDRs were encouraged to participate if they (1) had two separate households and (2) would have difficulty visiting the partner and returning back to their own residence in one day. This definition takes relativity of distance depending on means of travel into account and avoids confounding LDRs with commuters, whose lifestyle has been suggested to have different implications for their relationship (Anderson & Spruill, 1993; Bunker, Zubek, Vanderslice & Rice, 1992; Schneider, Limmer & Ruckdeschel, 2002/2003). Individuals in PRs were encouraged to participate if the partners lived in the same household.

For both samples, we included participants who met the following requirements: (a) they had no missings on the dependent variables, (b) they were at least 18 years old, and (c) they indicated to have a partner of the other sex. A total of 971 LDR participants and 278 PR participants met these inclusion criteria. The average age for participants in LDRs was 29.09 (range = 18-65,  $SD = 8.61$ ). Their average relationship length was 2.86 years and ranged from 1 month to 34 years ( $SD = 3.16$  years). For PRs, the average age was 33.42 (range = 18-60,  $SD = 8.6$ ). The average relationship length was 7.25 years and ranged from 3 months to 44 years ( $SD = 7.45$  years). Of both the LDR and PR respondents, close to 75% were female which is typical for studies of relationships based on self-selection of the participants.

Via email, the LDR sample was asked one year later to participate in a follow-up assessment. From the 971 participants at time 1, a total of 430 responded to the follow-up at time 2. As compared to nonresponders, responders scored higher in relationship satisfaction ( $t(940) =$

2.74,  $p < .01$ ;  $d = 0.18$ ), and significantly lower in both attachment anxiety ( $t(940) = -2.41$ ,  $p < .05$ ;  $d = -0.16$ ) and avoidance ( $t(940) = -3.27$ ,  $p < .001$ ;  $d = -0.21$ ). Thus, as in most longitudinal studies, participants with more negative relationships and more insecure attachment did not participate in the follow-up. There was however no systematic attrition with regard to the type of insecure attachment ( $F < 1$  for the interaction between type of insecure attachment [anxious versus avoidant] and participation in the follow-up [yes, no]).

## Measures

Participants completed the German version (Ehrental, Dinger, Lamla, Funken, & Schauenburg, 2009) of the Experiences in Close Relationships Questionnaire-Revised (ECR-R, Fraley, Waller, & Brennan, 2000). We reduced the original 36-item self-report questionnaire to a 20-item version by choosing the 10 highest-loading items as reported by Ehrental et al. (2009) for each attachment dimension. Examples of avoidance items are “I get uncomfortable when my partner wants to be very close” and “It helps to turn to my romantic partner in times of need” (reverse scored). Examples of anxiety items include “I worry that romantic partners won’t care about me as much as I care about them” and “I rarely worry about my partner leaving me” (reverse scored). Participants answered on a 7-point Likert scale, ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). Responses were then averaged across the 10 items for each dimension, with higher score indicating higher anxiety and avoidance, respectively. Mean attachment anxiety and avoidance for LDRs were 3.1 ( $SD = 1.4$ , Cronbach’s  $\alpha = .90$ ) and 1.9 ( $SD = 0.9$ ,  $\alpha = .84$ ). For PRs, mean anxiety was  $M = 2.7$  ( $SD = 1.4$ ,  $\alpha = .91$ ) and mean avoidance  $M = 2.2$  ( $SD = 1.2$ ,  $\alpha = .92$ ).

Second, we measured relationship satisfaction with the German translation (Sander & Böcker, 1993) of Hendrick’s (1988) Relationship Assessment Scale. The 7-item scale assesses overall relationship satisfaction with items such as “How well does your partner meet your needs?” and “How much do you love your partner?”, here on a 5-point scale, with higher scores reflecting higher relationship satisfaction. Mean satisfaction for LDRs was 4.0 ( $SD = 0.7$ ,  $\alpha = .86$ ), for PRs  $M = 3.9$  ( $SD = 0.8$ ,  $\alpha = .92$ ).

Participants also reported their age, sex, and length of the current relationship. Because relationship length showed a skewed distribution, it was log-transformed in all analyses.

As a measure of distance between the partners, participants in LDRs were further asked to report the usual travel time needed to reach their partner on a scale ranging from 1 (*less than 1 hour*), 2 (*1-2 hours*), 3 (*2-4 hours*), 4 (*4-6 hours*), to 5 (*more than 6 hours*),  $M = 3.6$ ,  $SD = 1.1$ ,

and their average frequency of face-to-face meetings, ranging from 1 (*less than once per month*), 2 (*at least once per month*), 3 (*at least every two weeks*), 4 (*at least once per week*) to 5 (*several times a week*),  $M = 2.5$ ,  $SD = 1.1$ . A last question concerned the stability of the LDR status throughout the length of the relationship and asked whether the relationship had always been LDR or was interrupted or preceded by PR times.

## Results

### Correlational Analyses

The intercorrelations for the study variables in both samples are displayed in Table 1, with correlations for LDRs above the diagonal and correlations for PRs below the diagonal. For LDRs, in line with predictions from hypothesis 3, the contextual factors distance between partners, operationalized as travel time, and face-to-face frequency were not significantly associated with relationship satisfaction. In fact, only a few significant correlations with these variables emerged. The negative correlation between travel time and face-to-face frequency indicates that face-to-face frequency is strongly related to how far the partners live apart. Interestingly, a small negative correlation between travel time and attachment avoidance points to participants being less avoidant the further the partner lives away. The small negative correlation between age and face-to-face frequency indicates that older LDR partners tend to not see each other as often as younger partners.

Table 1 also shows that in both LDRs and PRs, higher attachment anxiety and higher attachment avoidance are strongly associated with lower relationship satisfaction, although the size of the correlation differs. A pattern of interesting findings emerged with respect to relationship length and age. While in PRs no significant correlations appeared between relationship length and attachment or relationship satisfaction, in longer LDRs more attachment avoidance and less attachment anxiety was reported, as well as lower relationship satisfaction. In PRs as well as in LDRs, in turn, age was significantly positively correlated with avoidance and negatively with relationship satisfaction, indicating that older partners tend to be more avoidant and less satisfied in their relationships in both types of partnership. These results point to an intertwined nature of age and relationship length. While in PRs, they were not significantly correlated, in LDRs they were moderately so at  $r(969) = .28$ ,  $p < .01$ . There were no significant sex differences between the correlations.

## Mean differences depending on type of partnership

Because LDRs and PRs were significantly different regarding both log-transformed relationship length ( $t(1243) = 13.72, p < .001; d = 0.77$ ) and age ( $t(1243) = 7.41, p < .001; d = 0.50$ ), we controlled for both relationship length and age in all subsequent analyses. Sex was included as a covariate as well since there was a small but significant sex difference in the overall sample for attachment avoidance, with males reporting greater avoidance than females,  $t(1242) = 3.48, p < .001; d = 0.23$ .

Concerning hypothesis 1, a significant effect of type of partnership was found for attachment anxiety,  $F(1, 1236) = 4.93, p = .03$ , effect size Cohen's  $d = .16$ , indicating higher anxiety among LDRs. For attachment avoidance as the dependent variable, we confirmed the expected significant effect of type of partnership,  $F(1, 1236) = 4.13, p = .04$ , Cohen's  $d = .13$ , suggesting PRs score higher in avoidance than LDRs (see Figure 2-2-1-1). These effects of type of partnership remained significant if the other attachment dimension was additionally controlled in the analyses of covariance.

Repeating the comparison with a split LDR group depending on whether they had always been LDR or whether their relationship had been preceded or interrupted by PR times did not change the results. Comparing all three types of partnership, while PRs significantly differed from the continuous LDRs again on anxiety and avoidance, continuous LDRs did not significantly differ from discontinuous LDRs on any variable except for age,  $F(2, 1242) = 42.52, p < .001, \eta^2 = .06$ , and relationship length,  $F(2, 1242) = 156.32, p = .001, \eta^2 = .20$ . Bonferroni-adjusted post hoc comparisons indicated that the continuous LDR group was significantly older than the discontinuous LDR group ( $p < .001$ ), and had significantly shorter relationships than the discontinuous LDR group ( $p < .001$ ). The discontinuous LDR group generally held an intermediate position between the continuous LDRs and PRs on all variables however did not differ significantly from either one except for the aforementioned. In the next steps, we therefore restricted our analyses to the two original groups PR and LDR.

Lastly, as we expected from hypothesis 4, there was no significant effect of type of partnership on relationship satisfaction when controlling for sex, age and relationship length by analysis of covariance,  $F(1, 1236) < 1$ .

Although the previous findings supported our hypothesis that anxiety and avoidance might adjust depending on the type of relationship, an alternative (though less plausible) interpretation is that among insecurely attached individuals, more anxiously attached ones find it more attractive to enter a LDR whereas more avoidant ones tend to avoid LDRs. We therefore in-

vestigated whether a transition from a long-distance relationship to a proximal relationship changed participants' anxiety and avoidance scores. Using the follow-up data that assessed the stability of the relationship and the stability of type of partnership one year after the initial assessment, we performed a 2 (time) x 2 (type of partnership) mixed model ANCOVA controlling for sex, age, and relationship length. Type of relationship here distinguished between individuals that were LDRs at both time points (continuous LDRs) and those that were LDRs at t1 but had moved in together at t2 (discontinuous LDRs). Although the overall time x type of partnership interaction was only marginally significant for anxiety,  $F(1, 324) = 2.42, p = .12$ , simple main effects showed a significant increase in anxiety for the continuous LDRs between t1 and t2,  $F(1, 324) = 13.59, p < .001$ , but no significant change for the discontinuous LDRs ( $F < 1$ ); see Figure 2-2. Also, these two LDR subgroups did not differ significantly in their anxiety scores at t1,  $F < 1$ , but did so at t2,  $F(1, 324) = 8.43, p < .01$ . These results, together with our previous finding suggest that the higher anxiety in LDRs might be an adjustment to the specific relationship context rather than a self-selection effect. For avoidance, the time x type of partnership interaction was not even marginally significant, however,  $F(1, 324) < 1$ .

In summary, these results are a first indication that especially the level of anxiety might be tied to the LDR situation. The elevated level in the continuous LDR subsample suggests that anxiety might react to relationship conditions. A decrease in anxiety after becoming proximal might take longer to be observable, especially because we do not know when exactly participants moved in together between t1 and t2. Observing a change in avoidance might generally take longer to be observable as well. Taken together, these first results replicate the finding that there are no differences between LDRs and PRs concerning relationship satisfaction and no significant associations between the contextual factors distance between partners and face-to-face frequency and relationship quality in LDRs. In line with predictions, LDRs were further found to be more anxious and less avoidant than PRs. Together with the finding that continuous LDR partners show higher attachment anxiety after one year; this suggests that attachment orientations react to "corrective" relationship experiences by adjusting the secondary strategies.

### Influence of contextual factors on attachment

Because we found no significant correlations between the contextual factors of LDRs and relationship satisfaction as expected, we wondered whether the contextual factors in turn might influence the attachment orientations. Our notion was that they might directly influence

anxiety, leading to the high relational insecurity in LDRs reported in the literature. A strong influence on anxiety but not avoidance would therefore also explain the elevated anxiety level that was found in this study. A regression predicting avoidance from sex, age, relationship length, face-to-face frequency, and travel time revealed age ( $\beta = .12, p < .001$ ) as a positive and travel time as a significant negative predictor of avoidance ( $\beta = -.10, p < .05$ ), confirming the earlier finding that as distance between partners increases, avoidance decreases. Being a woman was also a significant negative predictor ( $\beta = -.09, p < .01$ ),

Anxiety, in turn, was predicted positively by being a woman ( $\beta = .07, p < .05$ ), and negatively by relationship length ( $\beta = -.17, p < .001$ ), travel time ( $\beta = -.13, p < .05$ ), and face-to-face frequency ( $\beta = -.11, p < .01$ ), indicating that anxiety is lower in longer relationships, the more often the partners see each other, and the greater the distance between them. The rather short relationship duration in LDRs as well as the relatively low face-to-face frequency in the sample therefore indicates why LDRs score higher in anxiety. Avoidance, in turn, could be low because distance between the LDR partners was found to be rather great in addition to the sample being young. Interestingly, greater distance between the partners seems to promote attachment security as it predicts both attachment dimensions negatively.

### Distinct Effects of Attachment on Relationship Quality

To answer hypothesis 2 concerning how anxiety and avoidance relate to relationship satisfaction, we analysed the data using hierarchical regression analysis. As the independent variables, sex, age and relationship length were entered as covariates in the first step. In the second step, we entered the attachment scores as well as the dummy-coded type of partnership (LDRs = 1, PRs = 0), followed in the third step by the interactions of type of partnership with anxiety and avoidance. All variables including the dichotomous independent variables were centered before the analysis (see Cohen, Cohen, West, & Aiken, 2003). Relationship satisfaction was entered as the dependent variable. The model accounted for 53% of the variance in relationship satisfaction (see Table 2). At step 1, age was a significant negative predictor at  $p < .001$  but not relationship length or sex. In step 2, anxiety and avoidance were also significant negative predictors (both  $p < .001$ ). Type of partnership itself was not a significant predictor of relationship satisfaction as could be expected from the previous ANCOVA analyses. At step 3, when controlling for covariates and main effects, the interaction of type of partnership with avoidance was found to be significant (unstandardized  $b = .04, p = .02$ ), indicating that avoidance is associated with lower relationship satisfaction in PRs than in LDRs. The interaction of type of partnership with anxiety was close to significance, (unstandardized  $b = -$



.02,  $p = .10$ ), suggesting that anxiety might by trend be associated with lower relationship satisfaction in LDRs than in PRs (see Figure 2-3 for both).

In sum, there was support for the hypothesis that attachment avoidance relates to lower relationship satisfaction in PRs than in LDRs, whereas anxiety by trend seems to be related to lower relationship quality in LDRs.

### Differences depending on age and relationship length

Lastly, we wanted to address the separate effects of age and relationship length. Concerning the differences between type of partnership, the covariates age and relationship length were shown to be differentially related to the outcomes. While age was significantly related to relationship satisfaction and avoidance (both  $ps < .001$ ), relationship length reached significance with respect to anxiety ( $p < .001$ ). To determine distinct effects, we conducted separate analyses for both variables. We split age into 3 age groups, differentiating a young adulthood group (18-28,  $n = 690$ ), middle adulthood group (29-38,  $n = 319$ ) and older adulthood group ( $> 39$ ,  $n = 240$ ). Next, we performed separate 3 (age group)  $\times$  2 (type of partnership) ANCOVAs with anxiety, avoidance, and relationship satisfaction as the dependent variables, controlling for sex and relationship length.

For anxiety, both the main effects for age group,  $F(2, 1230) = 3.26$ ,  $p < .05$ ,  $\eta^2 = .005$ , and type of partnership  $F(1, 1230) = 6.0$ ,  $p < .05$ ,  $\eta^2 = .005$  were significant, as well as the interaction term  $F(2, 1230) = 4.39$ ,  $p < .01$ ,  $\eta^2 = .007$ . Figure 4 shows that for PRs, attachment anxiety is higher than for LDRs in young age. While in PRs, anxiety is much lower in middle age than in young age, in LDRs the difference is only minimal. Compared to the middle age group, anxiety is slightly higher in the oldest group in PRs but much higher in LDRs, exceeding the level of the youngest group.

For attachment avoidance, again both the main effects for age group,  $F(2, 1230) = 16.79$ ,  $p < .001$ ,  $\eta^2 = .03$  and type of partnership,  $F(1, 1230) = 5.4$ ,  $p < .05$ ,  $\eta^2 = .004$  were significant, as well as the interaction term,  $F(2, 1230) = 4.52$ ,  $p < .01$ ,  $\eta^2 = .007$ . While PRs show higher avoidance from one age group to the next, LDRs show higher avoidance in middle age than young age, however not much of a difference between the middle and old age group. (Figure 4).

For relationship satisfaction, only the effect for age group was significant,  $F(2, 1230) = 16.18$ ,  $p < .001$ ,  $\eta^2 = .03$ , with all three age groups differing significantly from each other,  $ps < .05$ , such that the older the participants, the less satisfied they were in their relationship.

Next, we investigated relationship length. We formed four groups, one for the first 3 years of the relationship ( $n = 754$ ), the next for years 3-5 ( $n = 219$ ), one for years 5-7 ( $n = 123$ ), and the last one for relationships longer than 7 years ( $n = 149$ ). The groups were formed to represent both types of partnership, as the average relationship duration for LDRs was 2.86 years and 7.25 years for PRs. We performed a 4 (relationship length group)  $\times$  2 (type of partnership) ANCOVA with anxiety as the dependent variable, controlling for sex and age. Both the main effects for relationship length group,  $F(3, 1230) = 6.38, p < .001, \eta^2 = .02$ , and type of partnership  $F(1, 1230) = 4.01, p < .05, \eta^2 = .003$  were significant, while the interaction was not,  $F(1, 1230) < 1$ . In addition to the already established effect of type of partnership on anxiety, this analysis showed a decrease in anxiety over the course of a relationship. Bonferroni-adjusted post hoc comparisons indicated that participants with short relationships up to 3 years showed significantly higher anxiety than participants that had been in the relationship between 5 and 7 years or more than 7 years ( $ps < .05$ ), and these participants (5-7 years) showed significantly higher anxiety than participants with a partnership of more than 7 years ( $p < .05$ ).

For avoidance, the main effect for type of partnership was marginally significant,  $F(1, 1230) = 3.32, p < .07, \eta^2 = .003$ . The main effect for relationship length group was not significant,  $F(1, 1230) < 1$ , just like the interaction, as could be expected from the previous analyses with age groups where relationship length did not reach significance as a covariate. This indicates that avoidance changes only as a function of type of partnership and age. For relationship satisfaction, the finding was similar as only age reached significance,  $F(1, 1230) = 29.78, p < .001, \eta^2 = .03$ . In the prior ANCOVA with age as the independent variable, relationship length had not reached significance as a covariate as well,  $F(1, 1230) < 1$ . Therefore relationship satisfaction only seems to vary with respect to age.

These last analyses suggest that with respect to attachment, in the young and middle aged group PRs and LDRs resemble each other although LDRs tend to remain on a generally higher level for anxiety and lower level for avoidance. In the oldest group, however, anxiety does not differ much from the middle age level for PRs but increases for LDRs, and LDR's avoidance level is comparable to middle age while PRs show much higher avoidance. Over the course of the relationship, anxiety also tends to be lower for both PRs and LDRs while no significant effect was found for avoidance referring to relationship length. Hence, while anxiety depended on both age and relationship length, for avoidance only age mattered.

## Discussion

The present study is the first one to address attachment orientations and relationship quality in romantic long-distance relationships compared to proximal relationships. It extends previous literature by 1) introducing an interindividual perspective to LDRs by applying attachment theory to this novel domain, 2) by investigating whether transitions from LDR to PR and reverse affect the relationship, 3) using the largest LDR population-based sample published so far, 4) demonstrating that attachment orientations differ depending on type of partnership, 5) showing that these difference have differential effects for relationship quality depending on type of relationship, and 6) considering the role of age and relationship length for relationship processes in both types of partnerships.

Regarding hypothesis 1, as predicted LDRs reported more attachment anxiety and less avoidance than PRs. This finding was supported by the elevated anxiety level at time 2 for continuous but not for discontinuous LDRs, suggesting that attachment might adapt to the respective relationship context. Together with the previous studies that highlighted the element of relational insecurity as a characteristic feature in LDRs (Cameron & Ross, 2007, van Horn et al., 1997), our findings suggest that the elevated anxiety level in LDRs could be an adjustment to the long-distance relationship condition. This was supported by the prediction of anxiety from contextual factors in LDRs such as face-to-face frequency, relationship length, and distance between partners. For avoidance, the support was not as consistent. Apart from the lower avoidance in LDRs than PRs. Another indication of avoidance depending on relationship context can however be seen in the negative effect of distance between partners on avoidance.

For relationship quality, previous findings could be replicated by showing that relationship satisfaction was not associated with the contextual factors distance between the partners and face-to-face frequency (hypothesis 3), and did not vary as a function of type of partnership (hypothesis 4), controlling for age and relationship length.

Supporting hypothesis 2, although both anxiety and avoidance were negative predictors of relationship satisfaction in both LDRs and PRs, avoidance tended to be related to lower relationship quality in PRs than LDRs, and anxiety related to lower relationship quality in LDRs than PRs. Although attachment insecurity in general had detrimental effects for relationship quality in both LDRs and PRs, it hence seems that the secondary attachment strategy chosen when confronted with perceived non-availability of the partner has more or less detrimental effects depending on the type of partnership, indicating that relationship context might alleviate or emphasize negative effects of attachment insecurity on relationship quality.

Notably, our results showed that when splitting the LDR group into a continuous and a discontinuous group that had previously been PRs at some point, those two groups did not differ on relationship satisfaction and the attachment variables; however continuous LDRs significantly differed from PRs with respect to anxiety and avoidance whereas the discontinuous group did not. The discontinuous LDR group hence held an intermediate position between continuous LDRs and PRs on the investigated variables, further supporting the notion that attachment orientations might shift when relationship conditions change.

Finally, we addressed an important limitation of previous research by investigating the role of age and relationship length for attachment-related processes in the two types of relationship. Over the course of the relationship, anxiety tended to be lower for both LDRs and PRs. For age, we found that LDRs and PRs resembled each other with anxiety being lower with older age and avoidance being higher with older age, although this was less pronounced in LDRs. Their level of anxiety was elevated in the oldest group and avoidance only slightly lower in the oldest than middle aged group. The elevated anxiety level in older LDRs might characterize shorter LDRs that mainly developed after one or several previously failed relationships. As anxiety was found to be lower the longer a relationship exists and the more often partners see each other, shorter relationships in this age group could contribute to anxiety as well as the lower face-to face frequency among older LDRs as shown in the correlation matrix.

Hence, while for avoidance only age mattered, anxiety differed depending on both age and relationship length. Lastly, relationship satisfaction only varied with respect to age, such that older partners tended to be less satisfied in both types of partnership.

### Limitations and directions for future research

While our study has many strengths, its contribution needs to be evaluated in light of the limitations. First, our recruiting strategy could not control for self-selection bias, such that the participants who responded to the press release might have been happier with their relationships in the first place than those who did not respond, suggesting being careful when generalizing the findings. Second, the samples were recruited over the internet in a rather anonymous setting that we had no insight into. We did include checks to avoid multi-participation, random clicking and the occurrence of social desirability responses, but cannot fully exclude the possibility that some respondents did not answer reliably and truthfully. However, Gosling, Vazire, Srivastava, and John (2004) stated that web-based studies are generally not significantly impaired by unserious or repeated responding. Third, most of the effect sizes were found to be rather or very small. This study can hence only be a starting point and first indica-

tion of how attachment orientations depend on relational context. Further, we only assessed one partner from each LDR dyad, which does not enable us to investigate partner effects. It might be the case that while the LDR setting facilitates higher attachment anxiety, the partner might play a crucial role in amplifying (e.g., an insecure partner) or attenuating (e.g., a secure partner) this effect. As another example, while avoidance might be less detrimental than anxiety for one's own relationship evaluation in LDRs, it could be more detrimental to the partner's evaluation because of experiencing a reserved and emotionally distanced partner. In turn, an anxious partner might be perceived as committed and caring in LDRs rather than clingy and demanding because of the relationship conditions. Future research should explore these possibilities.

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**Table 2-1: Intercorrelations for attachment, relationship satisfaction, relationship length, age, and contextual variables**

	1.	2.	3.	4.	5.	6.	7.
1. Anxiety		.21**	-.48**	-.12**	.01	-.06	-.03
2. Avoidance	.24**		-.59**	.13**	.13**	-.09**	.04
3. Relationship satisfaction	-.39**	-.76**		-.10**	-.15**	.06	.01
4. Relationship length (in years)	-.10	-.03	.09		.28**	-.01	.05
5. Age	-.12	.23**	-.22**	-.05		-.06	-.07*
6. Travel time	-	-	-	-	-		-.63**
7. Face-to-face frequency	-	-	-	-	-	-	

**Note.** Correlations for LDRs appear above the diagonal, whereas correlations for PRs appear below the diagonal. \*  $p < .05$ . \*\*  $p < .01$ .

**Table 2-2: Multiple regression predicting relationship satisfaction from sex, age, relationship length, type of partnership, attachment, and attachment by type of partnership.**

Step	Variable	B	SE	$\beta$	R <sup>2</sup>	$\Delta R^2$
1	Sex	-.01	.05	-.01		
	Age	-.01	.00	-.17***		
	Relationship length	-.02	.02	-.03	.03***	
2	Sex	-.07	.03	-.04*		
	Age	-.01	.00	-.08***		
	Relationship length	-.05	.02	-.07**	.53***	.50***
	Type of partnership	-.04	.04	-.02		
	Anxiety	-.18	.01	-.35***		
	Avoidance	-.43	.02	-.56***		
3	Sex	-.03	.02	-.04*		
	Age	-.01	.00	-.08***		
	Relationship length	-.05	.02	-.07***	.53***	.003*
	Type of partnership	-.03	.02	-.04		
	Anxiety	-.17	.01	-.33***		
	Avoidance	-.44	.02	-.57***		
	Anxiety x type of partnership	-.02	.01	-.04		
	Avoidance x type of partnership	.04	.02	.05*		

**Note.** \*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

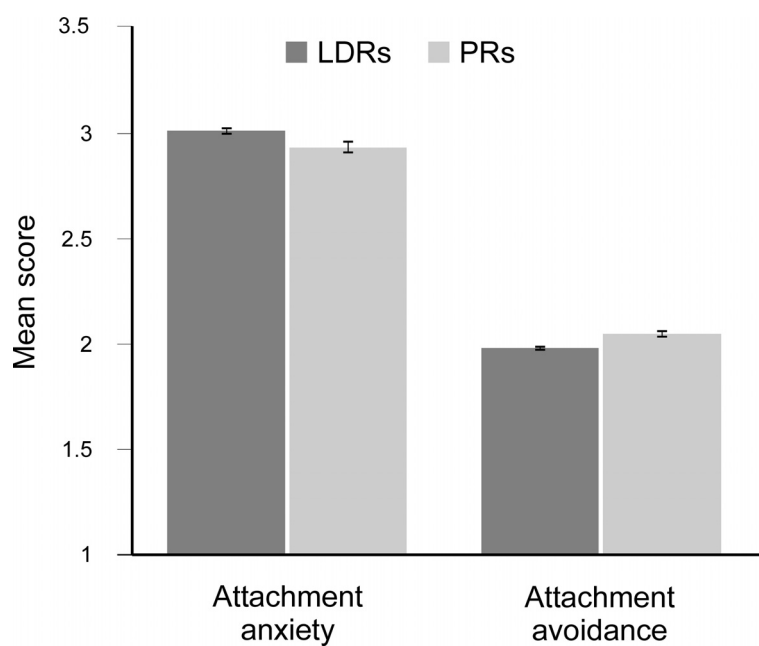


Figure 2-1: Mean differences in attachment anxiety and avoidance between types of partnership (controlling for sex, age and log-transformed relationship length)

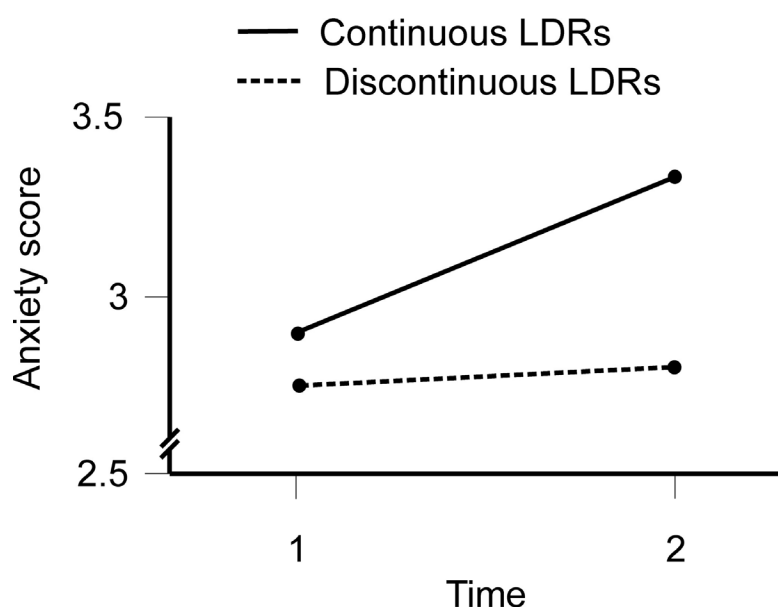
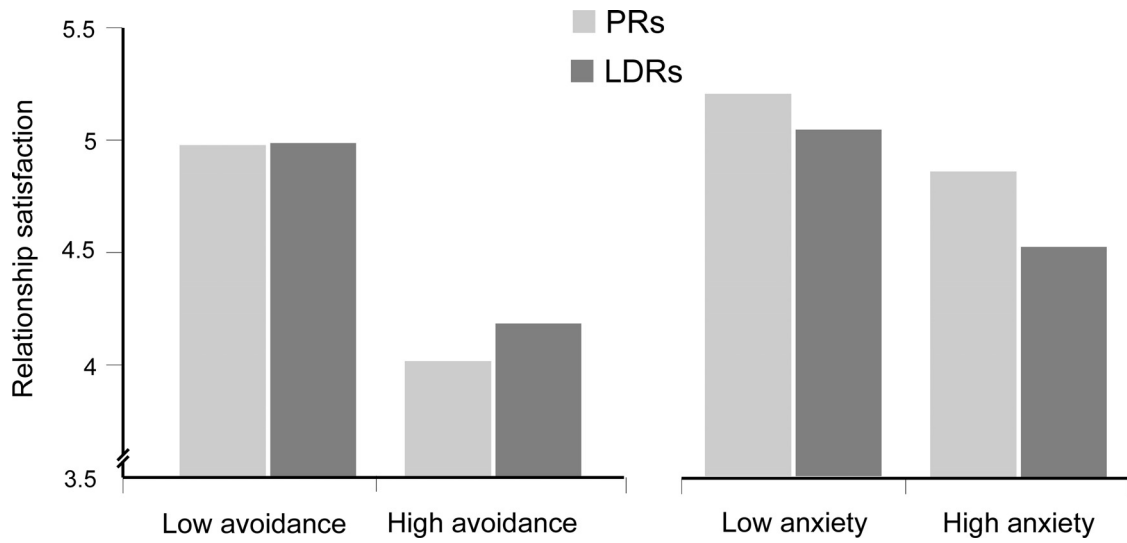
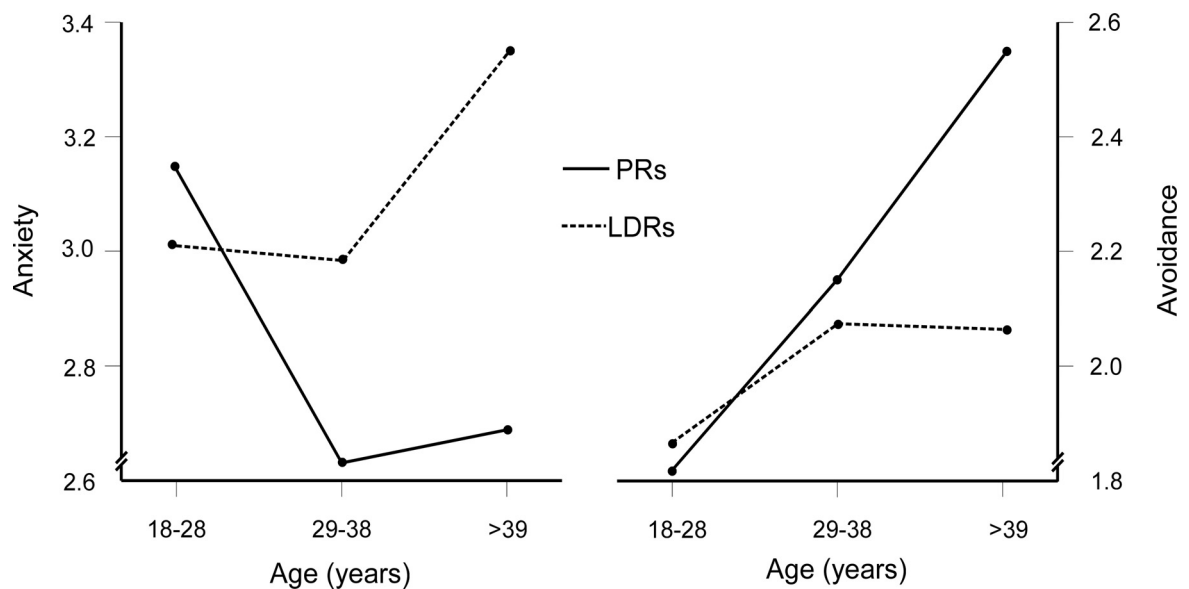


Figure 2-2: Mean differences in attachment anxiety between continuous and discontinuous LDRs at t1 and t2 (controlling for sex, age and log-transformed relationship length)



**Figure 2-3: Relationship satisfaction as a function of attachment avoidance and type of partnership and as a function of attachment anxiety and type of partnership (controlling for sex, age and log-transformed relationship length)**



**Figure 2-4: Anxiety and avoidance by type of partnership and age group (controlling for sex and log-transformed relationship length)**

## Chapter 3

# Shared everyday decisions and constructive communication: Protective factors in long-distance romantic relationships

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### Abstract

This study applied an attachment framework to explore whether shared everyday decisions (SHARED) and constructive communication during conflicts serve as protective factors for relationship quality and stability in a sample of 971 long-distance partners. The behaviors were found to partially and differentially mediate the association between attachment orientations and relationship outcomes. While SHARED was more strongly linked to commitment than to relationship satisfaction, the reverse was found for constructive communication. Only SHARED was found to predict relationship stability over and above attachment when relationship length was controlled for. The findings suggest that attachment anxiety and avoidance influence relationship quality and stability partly through the two communicative behaviors in LDRs, with especially SHARED emerging as a potent protective factor for positive relationship development in long-distance relationships.

## **Shared everyday decisions and constructive communication: Protective factors in long-distance romantic relationships**

As long distance relationships (LDRs) are becoming increasingly common in Western cultures (Guldner, 2003), in the past two decades relationship researchers have started to explore characteristics of long-distance romantic relationships and related indicators of relationship functioning. Mainly, studies have focused on the comparison of LDRs with proximal relationships (PRs) regarding relational outcomes such as commitment (e.g., Dellman-Jenkins, Bernard-Paolucci, & Rushing, 1994), relationship satisfaction (Guldner & Swensen, 1995; Stafford & Reske, 1990), and stability (Stafford & Merolla, 2007; Van Horn et. al, 1997).

However, despite being the most vital component of long-distance relationships' everyday life, not much is known about LDRs' communicative behavior beyond frequency and quality (see Sahlstein, 2000, for a review), such as individual variability in communication patterns and related consequences for the quality of the relationship.

The attachment behavioral system is responsible for maintaining proximity to attachment partners (Bowlby, 1980; Fraley & Shaver, 1998) and remarkably influences behavioral strategies in relationships (e.g., Gillath & Shaver, 2007). For LDRs, we assume that attachment orientations play an important role by regulating communicative behaviors with the partner. Although communication is essential to every relationship (Duck, 1995), in LDRs it has to be established through partners' efforts and might explicitly be used to fulfill attachment needs. As attachment is further predictive of relationship quality in itself (e.g., Hazan & Shaver, 1987; Kirkpatrick & Davis, 1994), this study suggests that the association between attachment orientations and relationship quality is mediated by two communicative behaviors in LDRs that are protective in that they ensure perceived emotional availability of the partner: shared everyday decisions (SHARED) and constructive communication during conflicts.

## **Attachment in Long-distance Relationships**

Since Hazan and Shaver's (1987) first publication on attachment in the context of romantic relationships, partner attachment and related aspects of relationship quality have been extensively investigated (e.g., Collins & Read, 1990; Kirkpatrick & Davis, 1994; Mikulincer & Shaver, 2003). Partners in romantic relationships are assumed to function as a secure base for exploration and a safe haven in the face of threats for each other (Bowlby, 1980). Partner availability, i.e., attentiveness, and responsiveness in times of need are considered to be the crucial factors that foster feelings of attachment security.

People have also been found to differ in their expression of attachment related needs and behavioral strategies when the partner seems unavailable (Mikulincer, Shaver, & Pereg, 2003). Attachment is usually conceptualized in terms of two basic attachment dimensions that are both rather detrimental to relationship quality in PRs, (e.g., Mikulincer & Shaver, 2007) namely anxiety and avoidance. Anxiety is characterized by a need for closeness and reassurance, constant worries about the availability of the partner and displays of clingy behavior. Avoidance is related to self-reliance, emotional distancing, limited self-disclosure to the partner, and suppressing attachment related thoughts and feelings (e.g., Brennan, Clark, & Shaver, 1998), Shaver & Mikulincer, 2002).

Following the thought that partner availability is central to the fulfillment of attachment needs, the physical separation of LDR partners should pose a threat to partners' emotional well-being and relationship quality. This could be shown using both physiological and self-report measures (Cafferty, Davis, Medway, O'Hearn, & Chappell, 1994; Feeney & Kirkpatrick, 1996). In a review by Vormbrock (1993) findings from a number of very early and mostly qualitative studies document effects of recurring separations from the partner. In most cases, this referred to women with husbands whose professions implied longer phases of absence from home. A variety of symptoms indicative of lowered emotional well-being and poorer relationship functioning in those couples were found both during times together and apart.

In contrast, more recent studies suggest that LDRs are no more likely to end their relationships than PR partners (e.g., Stafford & Merolla, 2007; Van Horn et al. 1997), have equal commitment levels (Baxter & Bullis, 1986; Dellman-Jenkins, Bernard-Paolucci, & Rushing, 1994), and were, in most studies, found to be equally satisfied with their relationship (e.g., Guldner & Swensen, 1995, Stafford & Reske, 1990).

One possible explanation of this discrepancy in the findings could be that the low to no possibility to establish contact to the partner in the early studies caused intense and chronic distress because partner availability was severely hindered, if not completely prevented. In contrast, nowadays LDRs have a wide range of opportunities to interact during times of separation, which enables the partners to turn to each other if needed. Shaver and Mikulincer (2002) stress that availability in attachment theory does not necessarily refer to physical presence, but rather to the perception of partner availability. We therefore argue that in LDRs this perception depends on the partners' efforts to establish availability by the means of communication. Döring and Dietmar (2003), who investigated associations of attachment with media use in LDRs, found that regardless of communication frequency mobile communication (mobile

phone, text messages) was especially used in attachment situations, i.e., when one of the partners needed help, comfort, or reassurance. This finding indicates that communication has potential to satisfy attachment needs by securing availability of the partner.

## **Communication in Long-distance Relationships**

Communication in romantic relationships in general has received considerable attention in the literature due to the substantial role it is assumed to play for relationship development, maintenance and possible dissolution. Daily interaction has been described as the essence of a relationship, Duck (1995) claimed that couples “talk their relationships into being”. With respect to LDRs, assuming this centrality of communication led to a focus on the discrepancy between the largely comparable relationship outcomes of LDRs and PRs despite the differences in frequency of contact between the two forms of partnership.

Stephen (1986) found that restricted communication like in LDRs strengthens the relationship between contact frequency and the degree of symbolic interdependence, i.e., a shared world view that serves as a strong bond between the partners. This finding was extended by Stafford and Reske (1991), who proposed that the restricted interaction and hence limited access to the partner’s behavioral repertoire in LDRs is associated with positive relational images. Their results supported the notion that being in a LDR seems to facilitate idealization of the partner and the relationship, thereby pushing relationship satisfaction up to or even above the level of PRs. Symbolic interdependence and idealization hence seem to successfully compensate for aspects of everyday life that LDRs lack in comparison to PRs.

Although these findings advance our understanding of general mechanisms by which LDRs are able to maintain and develop a positive relationship with their partner, they do not tell us about everyday behavior that has the potential to maintain a sense of relation to the partner when he or she is not actually present.

Sigman (1991) stressed that LDR partners as well as PR partners need to generate behaviors that help to keep the relationship present and real when partners cannot communicate as frequently as they wish. Especially for LDRs, those behaviors should be able to maintain a structure of reference and provide a sense of security, commitment, and “togetherness” for the partners in times of limited interaction.



## **SHARED and constructive communication**

For the present study, in line with the aforementioned, we wanted to identify protective communicative behaviors that a) had a high likelihood to be engaged in when the attachment system is activated. As Kobak and Duemmler (1994) noted, three types of situations tend to do that: fear-provoking situations (motivating people to seek out attachment partners as safe havens), challenging situations (leading people to make contact with a secure base partner), and conflictual interactions (activating concerns about the partners' availability). The behaviors should b) also address mutuality or balanced communication in LDRs as partner availability requires one partner to request availability and the other to comply. Lastly, they should c) have the potential to influence the partners' sense of connectedness over and above a specific interaction, such that the perception of a secure base is constructed.

Shared everyday decisions (SHARED), was developed for the purpose of this study. It refers to the current involvement of the partner in everyday decisions referring to topics such as the how and when of communication, finances, dealing with responsibilities and potential other partners, or the future of the relationship. SHARED therefore addresses challenging situations that could, but do not have to be solved with the partner's help, and measures the degree to which the partners initiate and accept mutual influence in their own everyday life routine. We argue that this secures a perception of partner availability and responsiveness by strengthening everyday connectedness and mutual long-term planning between the partners.

SHARED should therefore benefit the outcome variables in this study assessing relationship quality (relationship satisfaction and commitment) and stability. While SHARED is likely to be engaged in in attachment situations, individuals high in anxiety or avoidance should differ in their attempts to do so. Anxiety is characterized by generalized concerns about the availability of the partner and proximity maximizing strategies, which should elicit frequent attempts to establish closeness, involve the partner, and ask for advice or help. Avoidance, in contrast, is characterized by self-reliant, distancing, and low self-disclosure behavior, and should be negatively related to including the partner in everyday decisions.

The second behaviour, constructive communication, addresses how LDR partners deal mutually and positively with conflictual situations when partner availability is further endangered. Conflict management has been shown to be a crucial element of communication, with partners developing certain styles over time that are characteristic for their behavior during conflicts (e.g., Christensen, 1988). In PRs, constructive conflict styles have been shown to be strong and consistent predictors of relationship quality (e.g., Stafford & Canary, 1991). To our

knowledge, so far only one study by Stafford and Merolla (2007) addressed conflict management in LDRs. They found that LDR partners, compared to PRs, tend to rate their conflict management abilities and perceived communication quality higher. Interestingly, this could be predicted from the degree of idealization. This finding suggests that constructive communication during conflicts could be a powerful protective mechanism for relationship quality in LDRs by ensuring minimal negativity and fast resolution through balanced and mutually established communication, thereby re-establishing partner availability. Here, we therefore focused on constructive communication, rather than including other, more imbalanced or negative styles.

Because constructive communication in LDRs conveys the security that the partner is attentive, responsive, and positive even in difficult situations, we hypothesized that it transfers not only to higher relationship satisfaction, but also to higher commitment and the stability of the relationship. With regard to the attachment orientations, we expected both anxiety and avoidance to relate to lower constructive communication, as has been found in PRs (Mikulincer & Nachshon, 1991; Feeney, Noller, & Callan, 1994). In line with previous research, both attachment anxiety and avoidance are also expected to be negatively related to the three outcome variables (e.g., Feeney, 2002). Summing up:

The aim of the present study was to extend previous research by investigating 1) whether attachment orientations would directly and differentially influence communicative behaviors, 2) indirectly affect relationship quality, and 3) whether the communicative behaviors would benefit relationship quality and stability in LDRs.

H1: Higher levels of SHARED and constructive communication are positively associated with relationship satisfaction, commitment, and stability.

H2: Avoidance is negatively related to both behaviors while anxiety is negatively related to constructive communication and positively to SHARED.

H3: Attachment avoidance and anxiety are negatively associated with relationship satisfaction, commitment and stability.

Taken together, we propose a mediational model where constructive communication and SHARED are proposed mediators for the association between attachment and relationship outcomes (see Baron & Kenny, 1986). The hypothesized model is displayed in Figure 1.

## Method

### Sample

The study was conducted as an online questionnaire that could be entered through the online portal of the Department of Psychology, Humboldt University Berlin, Germany. A nationwide press release was published beforehand so that participants responded to various advertisements in newspapers, radio shows and online blogs all over the country. This strategy ensured getting a sample with a great variety in regional diversity, age and relationship experience. The latter was considered an advantage because most of the LDR research has been conducted with undergraduate students with limited relationship experience that is therefore hard to generalize. Communication seems to be especially important in long-term relationships, as it has been found to become more varied and complex as relationship duration increases (Sanderson & Karetsky, 2002) and to become a stronger predictor of marital satisfaction in longer established relationships (Feeney, 2002). We encouraged participants to take part in the study if they (1) had two separate households and (2) would have difficulty visiting the partner and returning back to their own residence in one day. (1) was chosen to explicitly tap LDRs and avoid confounding LDRs with commuters whose lifestyle might have different implications for their relationships (Anderson & Spruill, 1993; Bunker, Zubek, Vanderslice & Rice, 1992). (2) was developed following Dellman-Jenkins, Bernard-Paolucci, and Rushing (1994) who first defined LDRs with the time criterion “could not see their partner every day if desired”. Our slightly altered definition takes relativity of distance depending on usual means of travel into account.

Out of the 1353 participants that had signed up for the study, we included only participants who (a) were at least 18 years old, (b) indicated to have a partner of the other sex, and (c) had no missings on all central variables, resulting in a final sample of 971 participants. The average age for participants was 29.09 (range= 18-65,  $SD = 8.61$ ), and the average length of the relationship was 2.85 years, ranging from 1 month to 34 years ( $SD = 3.18$ ).

Participants were contacted via email one year after the initial assessment and asked about whether they were still with the same partner, or had broken up. From the 971 participants at time 1, a total of 430 responded to the follow-up at time 2 one year later. Responders significantly differed from non-responders on most variables at time 1, in that they scored higher than non-responders in relationship satisfaction ( $t(940) = 2.74, p < .01; d = 0.18$ ), SHARED ( $t(940) = 3.62, p < .001; d = 0.24$ ), constructive communication ( $t(940) = 2.85, p < .01; d = 0.19$ ); and significantly lower in attachment anxiety ( $t(940) = -2.41, p < .05; d = -0.16$ ), and

avoidance ( $t(940) = -3.27, p < .001; d = -0.21$ ). Due to this selective drop-out our analyses probably underestimate the respective effects although the effect sizes of the differences were small.

## Measures

Participants completed a shortened version of the Experiences in Close Relationships Questionnaire-Revised (ECR-R, Fraley, Waller, & Brennan, 2000; German version by Ehrenthal, Dinger, Lamla, Funken, & Schauenburg, 2009). The original 36-item self-report questionnaire was reduced to a 20-item version by choosing the 10 highest-loading items as reported by Ehrenthal et al. (2009) for the anxiety and avoidance dimension, respectively. Examples of avoidance items are “I get uncomfortable when my partner wants to be very close” and “It helps to turn to my romantic partner in times of need” (reverse scored). Examples of anxiety items include “I worry that romantic partners won’t care about me as much as I care about them” and “I rarely worry about my partner leaving me” (reverse scored). Participants answered on a 7-point Likert scale, ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). Responses were then averaged across the 10 items for each dimension. Mean attachment anxiety and avoidance were 3.1 ( $SD = 1.4$ , Cronbach’s  $\alpha = .90$ ) and 1.9 ( $SD = 0.9, \alpha = .84$ ), respectively.

We developed SHARED as an 8-item scale based on altered categories from Argyle and Furnham’s (1983) sources of conflict scale. Participants rated their current involvement of the partner in everyday decisions on a scale ranging from 1 (*not at all*) to 5 (*very much*) regarding categories such as “Finances”, “Planning of visits and activities”, “Common responsibilities”, “Long-term life planning”, or “Dealing with other potential partners” ( $M = 3.2, SD = 0.7, \alpha = .82$ ).

Mutual constructive communication was assessed with a 7-item subscale of the German version (Kröger et al., 2000) of the Communication Patterns Questionnaire (Christensen, A., 1988). The scale taps both partners’ perceptions of interaction patterns before, during, and after conflict. Examples of positive items include “When a problem in the relationship arises, both members try to discuss the problem” and “After the discussion both members think that the other has understood their position”. Participants rated each item on a 7-point Likert scale, ranging from 1 (*very unlikely*) to 7 (*very likely*). The scale score is calculated by adding up positive behaviors and subtracting demand-withdrawal as well as mutual avoidance items ( $M = 7.7, SD = 7.2$ ). Internal consistency was  $\alpha = .78$  and corresponds to what Kröger et al. have found.

We measured relationship satisfaction with the German translation (Sander & Böcker, 1993) of Hendrick's (1988) Relationship Assessment Scale. The 7-item scale assesses overall relationship satisfaction, here on a 5-point scale, with items such as "How much do you love your partner?" and "To what extent has your relationship met your original expectations?", with higher scores reflecting higher relationship satisfaction. Mean satisfaction was 4.0 ( $SD = 0.7$ ,  $\alpha = .86$ ).

Commitment was assessed with the German version (Grau, Mikula, & Engel, 2001) of the 7-item scale from the Rusbult Investment Model (Rusbult, Martz & Agnew, 1998). Sample items are "I want our relationship to last forever" and "I would not feel very upset if our relationship would end in the near future." (reverse scored). In this sample, participants responded on a scale from 1 (*do not agree at all*) to 5 (*agree completely*). Mean commitment was 4.3 ( $SD = 0.7$ ,  $\alpha = .81$ ).

## Results

Means, standard deviations, and intercorrelations for all study variables as well as relationship length are presented in Table 1. Notably, the means for anxiety are somewhat higher than what previous studies have found (e.g., Butzer & Campbell, 2008; Sibley, Fischer, & Liu, 2005). To ensure that this was not due to the use of the abbreviated scale, we compared the LDR sample with a control sample of proximal relationships that had filled out the same ECR-R scale. We found that LDRs in fact scored significantly higher in attachment anxiety than their proximal counterparts even after controlling for relationship length by analysis of covariance ( $F(1, 1237) = 3.71$ ,  $p < .05$ ; effect size Cohen's  $d = 0.16$ ). The only significant sex difference was found for attachment avoidance, with males reporting greater avoidance than females,  $t(969) = 2.85$ ,  $p < .01$ ;  $d = 0.21$ .

## Correlation among measures

While more avoidant individuals demonstrated lower levels of relationship satisfaction and commitment to the relationship according to predictions, anxious individuals only reported lower relationship satisfaction. Attachment anxiety and avoidance were also both negatively related to SHARED and constructive communication, respectively. For anxiety, the negative association with SHARED was unexpected. In line with predictions, significant positive correlations between the two communicative behaviors and relationship satisfaction and commitment, as well as relationship stability indicate that their use is associated with higher relationship quality. Higher attachment avoidance and anxiety was associated with lower stability.

Relationship length was correlated with almost every variable and therefore statistically controlled for in all analyses. It was log-transformed prior to analysis due to its skewed distribution.

## Mediation model

Next, to determine whether constructive communication and SHARED were mediators in our model, structural equation modeling was used. First, to assess overall model fit, path analysis was used to test the model in which constructive communication and SHARED mediate the association between both attachment orientations and the relationship outcomes satisfaction and commitment (see Figure 3-3-2). The model was estimated using AMOS 7. When including relationship length as a covariate, the model fit was good,  $\chi^2(3) = 6.80$ ,  $p = .08$ ; RMSEA = .036; CFI = .998. However, only the path to constructive communication was significant ( $-.16$ ,  $p < .001$ ) and model fit was significantly better when the variable was left out, according to a chi-square difference test ( $\chi^2(2) = 6.79$ ,  $p < .05$ ). The standardized path coefficients were virtually identical for the remaining variables; and therefore the results without relationship length will be reported here. The final model fitted the data very well,  $\chi^2(1) = .002$ ,  $p = .961$ ; RMSEA = .0001; CFI = 1.0.

The attachment and communication variables accounted for 57% of the variance in relationship satisfaction and for 42% of the variance in commitment. While both attachment dimensions were significantly negatively related to relationship satisfaction, for commitment the association was negative for avoidance and positive for anxiety, indicating that avoidant individuals tend to be less committed, while more anxious individuals tend to be more committed. This result is probably due to a suppressor effect of attachment avoidance, i.e., while anxiety has a zero correlation with commitment, once avoidance is taken into account in the path model, higher anxiety predicts higher commitment. Avoidance moreover had a strong direct negative effect on both constructive communication and SHARED. Anxiety had a direct negative effect on constructive communication as well, however no significant association with SHARED. This finding indicates that the negative correlation in Table 1 displays an indirect effect of avoidance as it is positively correlated with anxiety and stronger negatively with SHARED. While constructive communication was linked to both relationship satisfaction and commitment, the association with satisfaction was stronger and positive (.35), whereas the effect on commitment was small, but negative (-.09). Interestingly, for SHARED, the association with relationship satisfaction was positive but small (.09), whereas the effect on commitment was moderately strong and positive (.25). Finally, relationship satisfaction

had a strong direct effect on commitment. Overall, the model was statistically significant and explained a considerable amount of variance. When constraining paths to be equal for men and women, the results of the path analyses with freed versus constrained paths yielded a non-significant difference,  $\chi^2(14) = 16.49, p > .05$ , suggesting that the model is invariant with respect to sex.

### Bootstrap analyses

While AMOS can simultaneously evaluate models with several independent and dependent variables, and provides estimates and inferential tests for the total indirect effect of both mediators, it does not provide information about each path's unique contribution to the total indirect effect, i.e., the specific indirect effects. We therefore followed recommendations by Preacher and Hayes (2008) for evaluating multiple mediator models, and used their bootstrapping method for indirect effects based on 5000 bootstrap resamples to describe the confidence intervals of indirect effects such that no assumption about the distribution of the indirect effects is made. Interpretation of the bootstrap data relies on determining whether zero is contained within the 95% confidence intervals. Four sets of models had to be run in order to obtain estimates for both sets of independent and dependent variables (see Table 3-3-2).

First, we entered relationship satisfaction as the dependent variable, and either attachment anxiety or attachment avoidance as a predictor while controlling for the other attachment dimension. Constructive communication and SHARED were entered as assumed mediators. The same procedure was then applied for commitment as the dependent variable. The bootstrap results for anxiety as the IV and relationship satisfaction as the DV indicated that constructive communication was a significant mediator, with a point estimate of -.0452 and a 95% BCa (bias-corrected and accelerated) bootstrap confidence interval of -.0588, -.0343. SHARED, however, was not a significant mediator due to a point estimate of -.0023 and a 95% BCa CI of -.0062, .0005. For avoidance as the IV and relationship satisfaction as the DV both mediators were significant (constructive communication point estimate -.1055; BCa CI of -.1306, -.0812; and SHARED point estimate -.0300; BCa CI of -.0471, -.0146).

When repeating the analysis with anxiety as IV and commitment as the DV, again constructive communication was a significant mediator, point estimate -.0089 and a BCa CI of -.0183, -.0008, whereas SHARED was not, point estimate -.0052 and BCa CI of -.0124, .0017. Lastly, for avoidance, both mediators were significant (constructive communication point estimate -.0207; BCa CI of -.0408, -.0011; and SHARED point estimate -.0707; BCa CI of -.0924, -.0521).

In sum, the bootstrap analyses indicate that while constructive communication mediates both between anxiety and the outcomes and avoidance and the outcomes, SHARED only mediates the link between avoidance and relationship outcomes.

### Predicting relationship stability

Next we addressed Hypotheses 1 and 3 concerning the prediction of the stability of the relationship. We performed a series of hierarchical logistic regressions with relationship stability as the dependent variable. To test Hypothesis 1 addressing the predictive power of SHARED and constructive communication, relationship length was entered as a control in the first step, and both SHARED and constructive communication were entered in the second step. The overall model was significant according to the model chi-square statistic,  $\chi^2(2) = 19.36$ ,  $p < .001$ , hence, an improvement over the null model was confirmed. The model predicted 80% of relationship status at time 2 correctly and the inferential goodness-of-fit test Hosmer-Lemeshow (H-L test) yielded a  $\chi^2(8) = 4.42$  and was not significant ( $p > .05$ ), indicating good model fit. Relationship length ( $p < .001$ ) as well as SHARED ( $p < .001$ ) were found to be significant predictors of stability whereas constructive communication ( $p = .075$ ) was not.

Next, to see whether the attachment orientations predicted stability at time 2, anxiety and avoidance were entered in step two after controlling for relationship length. Overall goodness-of-fit was adequate, H-L test  $\chi^2(8) = 5.14$ ,  $p > .05$ , and the model chi-square statistic significant,  $\chi^2(2) = 23.10$ ,  $p < .001$ . In line with expectations, avoidance ( $p < .001$ ) was a significant negative predictor of stability, whereas anxiety ( $p = .055$ ) was only marginally significant.

In a last model, constructive communication and SHARED were entered in step three after relationship length in step one and the attachment orientations in step two to determine whether they predicted stability over and above the attachment orientations (Table 3-3). The results indicate good model fit, H-L test  $\chi^2(8) = 8.63$ ,  $p > .05$  and improvement over the null model,  $\chi^2(2) = 6.71$ ,  $p < .05$ . Again, relationship length was a significant predictor of stability ( $p < .001$ ) and avoidance a significant negative predictor ( $p < .01$ ). Anxiety also reached significance in this model ( $p = .05$ ). While constructive communication was again not significant as a predictor variable, SHARED was ( $p < .01$ ), suggesting predictive power for relationship stability even when controlling for differences in attachment orientations and length of the relationship.

To check whether the final model, i.e., predicting stability from SHARED and constructive communication while controlling for attachment, improved model fit compared to the model with attachment only, the difference in the -2 Log likelihood (-2 LL) of both models was



computed. The difference between -2LL values for models with successive terms has a chi-square distribution, which allows to test whether adding one or more additional predictors significantly improves the fit of the model. Here, the difference between the models was significant,  $\chi^2(2) = 14.19, p > .001$ .

In summary, attachment avoidance was found to be a significant negative predictor of relationship stability, and attachment anxiety a marginally significant negative predictor one year after the first assessment when differences associated with relationship length were controlled for. SHARED was found to be a powerful positive predictor of stability, even after controlling for both relationship length and attachment orientations.

## Discussion

The present study is the first one to address communication-related processes in romantic long-distance relationships within an attachment framework. It extends previous literature by examining protective communicative behaviors beyond communication frequency and perceived quality, thereby taking interindividual variability into account. We found that while attachment avoidance and anxiety were, with two exceptions, negatively related to communicative behaviors and relationship outcomes, SHARED and constructive communication mediated the association between attachment avoidance and both relationship satisfaction and commitment. Only constructive communication also mediated the association between attachment anxiety and relationship outcomes. SHARED had a stronger positive association with commitment, whereas constructive communication had a stronger positive association with relationship satisfaction. Moreover, SHARED served as a powerful protective factor for positive relationship development, as it was predictive of relationship stability after controlling for differences in attachment orientations and length of the relationship. Below, we discuss the patterns of findings with regard to the hypotheses in more detail.

### Communicative behaviors and relationship quality and stability

Both SHARED and constructive communication were significantly associated with relationship satisfaction and commitment, indicating that their use relates to higher relationship quality. However, results differed from predictions in the behaviors' distinctive power to predict relationship outcomes. In particular, SHARED was more predictive of commitment than of relationship satisfaction, whereas constructive communication was more predictive of satisfaction and even slightly negatively related to commitment. This suggests that, in LDRs, constructive communication in conflict situations directly benefits relationship satisfaction but

has only very little influence on commitment to the relationship. As LDRs have been found to report higher relational insecurity than PRs (Cameron & Ross, 2007; Van Horn et al., 1997), it might be that arguments are perceived to be more harmful with regard to relationship maintenance. Good conflict management skills and resolved conflicts might therefore, on the one hand, contribute to satisfaction with the relationship but on the other hand maintain or even inflate the level of relational insecurity, and hence not benefit commitment to the relationship.

In contrast, the results for SHARED indicate a direct positive effect on commitment and a small positive effect on satisfaction, suggesting that mutual negotiation of everyday decisions might indeed facilitate establishing a long-term bond and everyday connectedness between partners. For LDRs, this might contribute to the feeling of a shared everyday life, increasing relational security and result in higher commitment to the relationship. A possibility is that SHARED is perceived as an indicator of investment in LDRs that can be observed by the partners on a day-to-day basis.

Regarding relationship stability, only SHARED was a significant predictor, and it was so even after controlling for differences in relationship length and attachment orientations. This finding, besides underlining the established link between commitment and stability (e.g., Rusbult, Martz, & Agnew, 1998), again supports the notion that SHARED might increase relational security among LDRs by ensuring partner availability and therefore serves as a protective factor for relationship development in LDRs. Contrary to expectations, constructive communication had no predictive power for relationship stability. The reasons seem to be the same as for the results concerning the link between constructive communication and commitment.

## Attachment and communicative behaviors

As expected, attachment avoidance showed a negative association with both constructive communication and SHARED. Avoidant partners hence tend to be less constructive in conflict situations and involve their partner less in everyday decision making. This finding supports previous results that show that avoidance is related to limited self-disclosure and heavy self-reliance (Mikulincer & Shaver, 2002). For anxiety, the expected negative association with constructive communication could be confirmed, whereas the hypothesized positive association to SHARED could not. In fact, the latter was the only non-significant path in our model. This finding indicates that although more anxious partners would probably like to use SHARED because of their need for closeness and reassurance, they do not manage to realize it. Maybe involving the partner in everyday decisions for attachment anxiety depends on how

much the partner involves, in turn. It has been shown that anxious attachment is linked to constant monitoring of the partner and that evaluation of the relationship is very reactive to recent events (e.g., Mikulincer & Shaver, 2003). It could be that SHARED is therefore used inconsistently and in reaction to current partner behavior. The tendency to demand could also lead to asking the partner for SHARED while not complying with it oneself.

Notably, there were also large differences in the associations between attachment and the communicative behaviors. It seems that although attachment insecurity in general is related to less use of these protective behaviors, more avoidant individuals still use them significantly less than more anxious individuals, which points to avoidant individuals in LDRs being more at risk for negative relationship development than more anxious individuals.

### Attachment and relationship quality and stability

The above view was also supported by the results concerning the association between attachment orientations and relationship stability. Avoidance was a strong negative predictor of relationship stability, whereas anxiety was only a marginally significant negative predictor one year after the first assessment.

In line with previous research, both attachment anxiety and avoidance were negatively related to relationship satisfaction as expected. Attachment insecurity in general can therefore be assumed to be detrimental to relationship satisfaction in LDRs. With regard to commitment, the association with avoidance was also significantly negative as hypothesized, suggesting that more avoidant individuals tend to be less committed. In contrast, anxiety predicted commitment positively, indicating that more anxious individuals in LDRs tend to be more committed. The positive link between anxiety and commitment, although contrary to findings in PRs (e.g., Simpson, 1990) also helps to explain why anxiety does not show a similarly negative association with stability as avoidance. Recently, it was also found that commitment can successfully buffer the negative effects of anxiety (Tran, Simpson, 2009).

### Communicative behaviors as mediators

In line with our hypotheses, constructive communication and SHARED served as mediators for the association between attachment and relationship outcomes. While constructive communication mediated both between anxiety and the outcomes and avoidance and the outcomes, SHARED mediated only the link between avoidance and relationship outcomes. This latter finding can be attributed to the non-significant association between attachment anxiety and SHARED already discussed. Altogether, attachment orientations could be shown to ex-

hibit differential indirect effects on relationship outcomes though the two communicative behaviors.

## **Limitations and conclusions**

While our study has many strengths such as the large sample size drawn from the general population and the prospective study of LDR development, a limitation is the assessment of only one partner from each LDR dyad which did not enable us to detect possible partner effects which could, for example, identify factors that might explain the finding why anxiety is not significantly linked to SHARED. Another limitation is the possibility of a self-selection bias. The participants who responded to the press release might have been happier with their relationships in the first place. Also, participants who took part in the follow-up assessment after one year significantly differed from those who did not on almost all of the variables at time 1. Individuals whose relationship development was less successful might therefore have been underrepresented at time 2, resulting in an underestimation of the respective effects.

An additional limitation is the anonymity of the questionnaire. Although we included checks to make sure no participant could participate in the study twice and offered several incentives to reduce random clicking and the occurrence of social desirability responses, we cannot fully exclude the possibility that this still happened.

Despite these limitations, the present study made a contribution to the literature by demonstrating the relationship between attachment, communication structures, and relationship quality and development in LDRs. First, the study addressed an important limitation of previous research by investigating a diverse LDR sample with a large variance in relationship experience. Notably, relationship length was associated with more avoidance and less anxiety, and emerged as a strong predictor of stability. Second, the reported findings indicate that the investigated communicative behaviors, especially SHARED, can serve as powerful protective factors for relationship quality and development in LDRs, and clarify the role of interindividual differences in attachment orientations for the use of communicative behaviors and relational success in LDRs.

Importantly, it is possible that the same patterns of associations could also have been found in samples of PR, as SHARED and constructive communication can be imagined to benefit every relationship regardless of its circumstances. However, the emphasis of this study was not on contrasting LDR and PR relationship processes. Rather, we wanted to understand distinct behaviors that might act as protective factors in LDRs by ensuring perceived partner availability. Although we did not observe or experimentally manipulate whether the two be-

haviors were engaged in attachment situations, the powerful associations found in this study between the two behaviors and attachment on the one side and relationship quality on the other side support the notion that communication is one important route for LDRs to establish and maintain significant attachment bonds.

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**Table 3-1: Correlations, descriptive statistics, and internal consistencies of all measures**

	1.	2.	3.	4.	5.	6.	7.	8.
1. Anxiety	<b>.90</b>	.22**	-.13**	-.35**	-.49**	.03	-.12**	-.15**
2. Avoidance		<b>.84</b>	-.40**	-.43**	-.59**	-.50**	.14**	-.19**
3. SHARED			<b>.82</b>	.19**	.34**	.39**	-.05	.18**
4. Constructive communication				<b>.78</b>	.60**	.25**	-.17**	.08
5. Relationship satisfaction					<b>.86</b>	.50**	-.10**	.31**
6. Commitment						<b>.81</b>	-.04	.20**
7. Relationship length (in years)							-	.16**
8. Relationship stability								-
(0 = no, 1 = yes)								
Mean	3.11	1.93	3.20	7.68	4.00	4.30	2.85	-
SD	1.43	0.86	0.74	7.18	0.71	0.67	3.18	-

**Note.** Internal consistencies are displayed in bold along the diagonal.

No  $\alpha$  can be calculated for relationship length and stability.

N=971, for stability N=429.

\*\*  $p < .01$ .

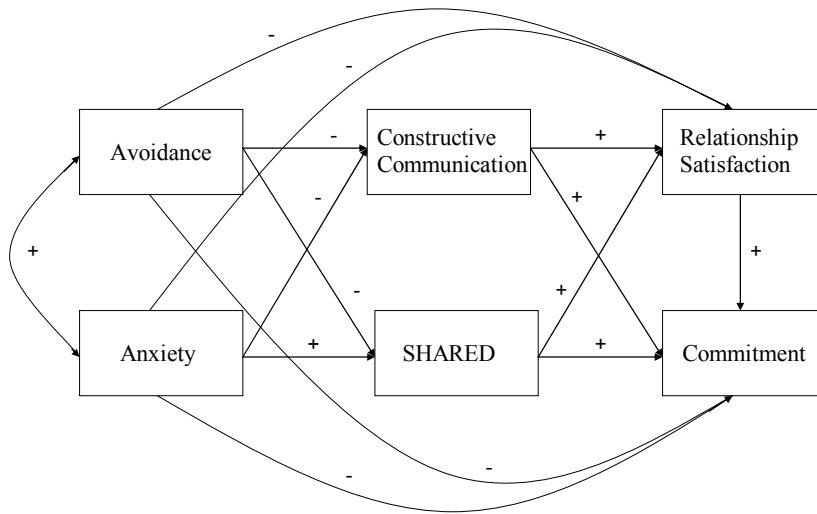
**Table 3-2: Multiple mediation of the indirect effects of attachment anxiety and avoidance on relationship outcomes satisfaction and commitment through changes in constructive communication and shared everyday decisions (SHARED)**

IV/DV	Multiple Indirect effects	Point estimate	BCa 95% CI	
			Lower	Upper
Anxiety/Satisfaction	Constructive communication	-.0452	-.0588	-.0343
	SHARED	-.0023	-.0062	.0005
	Total	-.0474	-.0613	-.0359
Avoidance/Satisfaction	Constructive communication	-.1055	-.1306	-.0812
	SHARED	-.0300	-.0471	-.0146
	Total	-.1355	-.1656	-.1049
Anxiety/Commitment	Constructive communication	-.0089	-.0183	-.0008
	SHARED	-.0052	-.0124	.0017
	Total	-.0141	-.0256	-.0030
Avoidance/Commitment	Constructive communication	-.0207	-.0408	-.0011
	SHARED	-.0707	-.0924	-.0521
	Total	-.0914	-.1188	-.0646

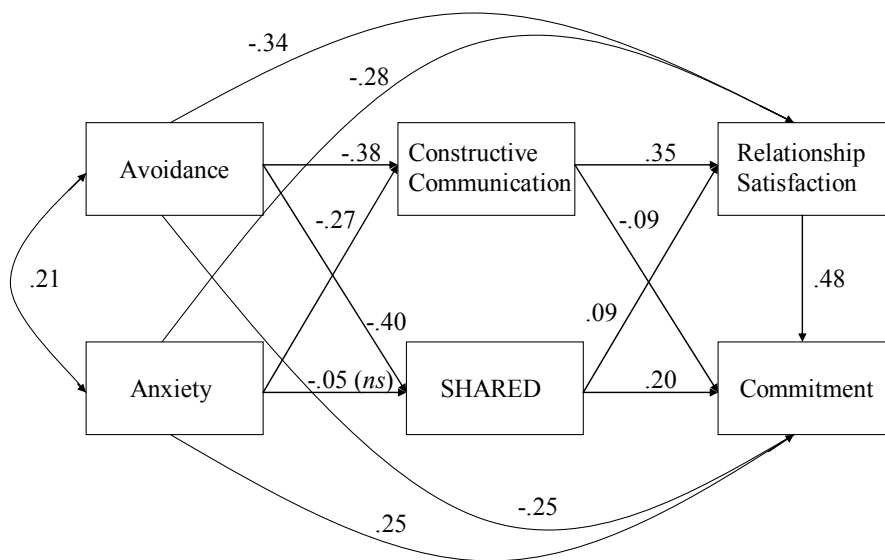
**Note.** BCa = bias corrected and accelerated bootstrapping confidence intervals that include corrections for both median bias and skew. Confidence intervals containing zero are not significant.

**Table 3-3: Summary of hierarchical logistic regression predicting relationship stability from relationship length, attachment, and communication**

Step		$\beta$	SE	Odds ratio	Wald statistic	df	p
1	Relationship length	.49	.13	1.63	13.25	1	
2	Relationship length	.53	.14	1.70	14.42	1	.000
	Anxiety	-.17	.09	0.84	4.14	1	.042
	Avoidance	-.60	.14	0.55	17.30	1	.000
3	Relationship length	.53	.15	1.70	13.17	1	.000
	Anxiety	-.18	.09	0.84	3.75	1	.053
	Avoidance	-.48	.17	0.62	8.04	1	.005
	SHARED	.48	.19	1.62	6.46	1	.011
	Constructive communication	-.005	.02	0.99	0.06	1	.808
Test					$\chi^2$	df	p
Likelihood ratio test					6.71	2	.035
Hosmer & Lemeshow					8.63	8	.375



**Figure 3-1: Hypothesized mediation model relating attachment, communication, and relationship outcomes**



**Figure 3-2: Standardized parameter estimates of the mediation model relating attachment, communication, and relationship outcomes**

## Chapter 4

# Sexual satisfaction in long-distance relationship couples: A mutual influence model

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### Abstract

This study explored predictors of sexual satisfaction in 1) a sample of 75 couples living in long-distance relationships (LDRs) and 2) 971 LDR individuals. Using the Actor-Partner Interdependence Model (APIM; Kashy & Kenny, 2000), actor effects of relationship satisfaction and sexual difficulties during mutual visits were found to be the most influential predictors. No significant partner effects emerged, indicating that the model is better conceptualized as a mutual-influence model (Kenny, 1996), with influence among partners on the outcome variable only. Analyses at the individual level replicated the main predictors and demonstrated that anxiety moderates between relationship satisfaction and sexual satisfaction, such that the association is weaker for highly anxious and stronger for low anxious individuals in LDRs. In both samples, the link between relationship satisfaction and sexual satisfaction was also weaker for women than for men.

## **Sexual satisfaction in long-distance relationship couples: A mutual influence model**

As long-distance relationships are becoming an increasingly common type of partnership in western cultures (Guldner, 2003), relationship researchers have started to investigate general indicators of relationship functioning in LDRs in the past two decades in a mainly comparative fashion. Relationship satisfaction, commitment, and stability of LDRs, for example, have been contrasted to proximal relationships (PRs) to address differences and similarities in general relationship processes depending on the type of partnership.

However, sexuality in LDRs has not been investigated at all yet. Although it is, besides attachment and caregiving, one of the three major behavioral systems in adult romantic relationships (Shaver, Hazan, & Bradshaw, 1988), we know nothing about how LDRs experience sexuality with their partner. This might be due to the fact that sexuality in LDRs cannot easily be compared to sexuality in PRs, for example when addressing sexual satisfaction. Because of the limited physical, sexual, and emotional availability of the partner, i.e., general constraints inherent in the relationship conditions, indicators for sexual satisfaction in PRs might not apply to LDRs or have a different relevance for the partners. Hence, understanding sexuality in LDRs might require explicitly looking for predictors that take the specific circumstances of the relationship into account.

The purpose of the present article was to fill this gap in the literature by exploring predictors of sexual satisfaction in two LDR samples. We used 1) a sample of 75 LDR couples to address possible interdependence of partners by looking at actor and partner effects of the proposed predictors. We then replicated the main predictors in 2) a sample of 971 individuals in LDRs and investigated possible moderators.

### **Relationship quality in LDRs and PRs**

Regarding indicators of general relationship functioning, LDRs have been found to be more similar to PRs than different from them. They are no more likely to end their relationships than PR partners (e.g., Stafford & Merolla, 2007; Van Horn et al. 1997), have equal commitment levels (Baxter & Bullis, 1986; Dellman-Jenkins, Bernard-Paolucci, & Rushing, 1994), and were, in most studies, found to be about equally satisfied with their romantic relationship (e.g., Guldner & Swensen, 1995, Stafford & Reske, 1990). Although a core feature of LDRs is the physical distance between the partners and the relatively low face-to-face frequency, it has been shown that there are no significant associations between the geographical distance



between the partners, length of separation, and frequency of visits with relationship satisfaction or stability (Guldner & Swensen, 1995; Schwebel, Dunn, Moss, & Renner, 1992).

For sexual satisfaction, no such comparisons between LDRs and PRs are available. Many aspects that contribute to relationship quality in PRs can presumably be fulfilled as well or compensated in LDRs, as the aforementioned results demonstrate. For sexuality it is hard to imagine how this would be done.

Because to date there are no studies on aspects of sexual life in LDRs to base our hypotheses on, we generated our predictions by adjusting findings from PRs to LDRs, taking into account the significantly different relationship circumstances. We refer to Lawrance and Byer's (1995) definition of sexual satisfaction as an affective response generated from one's subjective evaluation of both positive and negative dimensions associated with one's sexual relationship. First, possible predictors related to the frequency or perceived quality of sexual interactions between LDR partners were considered. Second, we added non-sexual predictors that have been found to be associated with sexual satisfaction in PRs.

### **Sexual predictors in LDRs**

*Frequency of mutual visits.* As in PRs a higher frequency of sex is related to higher sexual satisfaction (e.g., Auslander et. al, 2007, Blumstein & Schwarz, 1983; Haavio-Mannila & Kontula, 2004), the frequency of mutual visits was considered as a predictor for sexual satisfaction in LDRs. Here, it represents the average number of opportunities for sexual encounters with the partner and at the same time characterizes typical intervals where no (non-virtual) sexual interactions are possible. We therefore expected more frequent visits to contribute to sexual satisfaction. We chose this predictor rather than the average frequency of sex during visits, because that varies greatly depending on frequency and length of visits, and actual time together as a couple, such that average frequencies can hardly be estimated.

*Sex with the partner during separation.* In a similar manner, sexual interactions with the partner during the times apart (e.g., phone sex) should positively influence sexual satisfaction. The difference is, clearly, that the partner is not actually present. Here, we assume that it is the perception to engage in some kind of sexual behavior over the distance that is important, whether this is evaluated as sexual interaction for other people or not (e.g., exchanging erotic letters or pictures).

*Sex drive.* We further assumed sex drive, as a general measure of "readiness" for sexual actions, to be positively associated with sexual satisfaction in LDRs. Individuals with a high sex

drive should be more likely to initiate and engage in sexual behaviors with their partner than those with a low sex drive, both during visits and during times apart. We thought of this as a more indirect measure of frequency of sex. For PRs, Hurlbert and Apt (1994) state that sexual desire is a correlate of sexual satisfaction, and Brezsnyak and Wishman (2004) even found it to be significantly associated with marital satisfaction.

*Sexual difficulties.* As sexual satisfaction also depends on both partners' expectations and the perceived own capacity to fulfil them (Hurlbert & Apt, 1994), it was assumed that perceived difficulties to relate to the partner sexually during visits should significantly impair sexual satisfaction. It has been found that partners in LDRs feel a sense of "estrangement" first after meeting their partner again (Vormbrock, 1993), which might lead to perceived sexual difficulties. The pressure for quality during visits (Sahlstein, 2004) could also lead to problems and a heightened sense of awareness for difficulties. Hence, we focused on the perceived problems rather than asking for the quality of the sexual encounters because we expected more variance in the responses.

## **Relationship satisfaction and sexual satisfaction**

In PRs, an association between relationship satisfaction and sexual satisfaction has been consistently found, both for married (Blumstein & Schwartz, 1983) and premarital couples (Sprecher, 2002). Both constructs have been shown to mutually affect each other over time (Byers, 2005) and change concurrently (Sprecher, 2002). As the causal link remains unclear and we were interested in sexual satisfaction as an outcome variable, here relationship satisfaction was added as a predictor. In support of this, in PRs Lawrance and Byers (1995) found that relationship satisfaction uniquely added to the prediction of sexual satisfaction over and above their other predictor variables. Further, when controlling for relationship satisfaction, the other variables still significantly contributed to sexual satisfaction, indicating that sexual satisfaction does not simply equal relationship satisfaction. It is conceivable that overall satisfaction within a relationship leads to conclusions about all parts of the relationship, including sexuality. This should be especially true when there is limited actual sexual interaction or information about the evaluation of sexual aspects of the relationship.

Notably, Lawrance and Byer's Interpersonal Exchange Model of Sexual Satisfaction (IEMSS, 1995) which considers sexual costs and benefits for the partners as predictors of sexual satisfaction, has potential to be applicable to LDRs as well. However, several papers (Byers, 2005; Byers, Demmons, & Lawrance, 1998; Sprecher, 2002) emphasize that the association between sexual exchanges and sexual satisfaction explains much more variance in

long term relationships (31% in Lawrance & Byers, 1995) than in dating couples (8% in Byers, Demmons, & Lawrance, 1998), whereas the reverse was found for relationship satisfaction. As LDRs are rather young on average and have a much shorter relationship duration than PRs (Jimenez, Neberich, & Asendorpf, submitted) we focused on relationship satisfaction due to the large number of predictors additionally considered.

### **Attachment and sexual satisfaction**

Since the late 1980s, attachment theory has been an important framework in researching romantic relationships (Fraley & Shaver, 2000; Hazan & Shaver, 1987). The way in which a person is attached to their partner has been shown to affect sexual satisfaction itself (e.g., Davis, Shaver & Vernon, 2004; Davis et al., 2006) as well as the connection between relationship satisfaction and sexual satisfaction (Birnbaum, Reis, Mikulincer, Gillath, & Orpaz, 2006; Butzer & Campbell, 2008).

As anxious individuals fear that a partner could not be available, attentive or responsive when needed (Impett, Gordon & Strachman, 2008; Mikulincer, Shaver & Pereg, 2003), they tend to monitor physical or emotional proximity of attachment figures and try hard to maintain it (Cassidy & Berlin, 1994; Simpson, Ickes & Grich, 1999). Research shows that they have sex to please their partner, to foster closeness and gain approval, and to reduce insecurity (Birnbaum, 2007; Davis, Shaver & Vernon, 2004).

Avoidant individuals, in contrast, tend to find close sexual relationships uncomfortable and unrewarding (Mikulincer & Shaver, 2007; Tracy, Shaver, Albino, & Cooper, 2003), and either distance themselves from sex if possible (e.g., Gentzler & Kerns, 2004), or limit emotional intimacy during sexual encounters (e.g., Schachner & Shaver, 2004).

After finding that both anxiety and avoidance are associated with lower levels of sexual arousal, pleasure, and satisfaction (Fricker & Moore, 2002; Morrison, Urquiza, & Goodlin-Jones, 1997), recently the link between relationship and sexual satisfaction has also been investigated. While anxious individuals have been found to show strong links between day-to-day sexual experiences and subsequent relationship interactions and evaluations (Birnbaum et al., 2006; Tracy et al., 2003), attachment avoidance was found to cushion the effects. Davis et al. (2006) also found that anxiety was correlated with the explicit belief that sex served as a barometer of relationship status, indicating that anxiously attached individuals emphasize recent events in evaluating their relationships. Finally, Butzer and Campbell (2008) found that anxiety serves as a moderator between sexual satisfaction and overall marital satisfaction,

with sexual satisfaction being more strongly associated with marital satisfaction for highly anxious than less anxious participants.

As in LDRs anxious individuals are not able to regularly monitor their partner, nor use sex to establish closeness and reduce insecurity, anxiety should not contribute to sexual satisfaction much. For avoidance, the discomfort with physical and emotional intimacy should also not benefit sexual satisfaction, as it limits sexual interaction both during visits and during times apart. Further, we expect attachment anxiety but not avoidance to serve as a moderator between relationship and sexual satisfaction. However, we propose a different effect than Butzer and Campbell (2008). In addition to flipping the assumed causality regarding relationship and sexual satisfaction, we hypothesize that in LDRs the link is weaker for anxiety rather than stronger. Even when relationship satisfaction is high among highly anxious, sexual satisfaction might still be low. Anxious individuals should not rely on relationship satisfaction much when evaluating sexual satisfaction, but rather focus on the few recent indicators of actual sexual interaction. Individuals low in anxiety, however, are expected to generalize more from their overall satisfaction with the relationship.

### **Interdependence of partners**

Relationship researchers have increasingly addressed the interdependence among romantic relationship partners in the past years and found substantial support for the notion that partners influence one another on many variables associated with the relationship (e.g., Brassard, Shaver, & Lussier, 2007; Kane et al., 2007). As no study to date has investigated whether this is also the case for LDR partners, it was the last and a central question we wanted to investigate in this study. LDR partners perceive to have satisfying, close, and committed relationships. However they do not share a household or an everyday routine, in fact, they are not even physically present most of the time. We wondered whether this made a difference in generating interdependence among partners, especially in the area of sexuality.

The question was addressed using the Actor-Partner Interdependence Model (APIM; Kenny & Cook, 1999; Kashy & Kenny, 2000). This dyadic data analytic approach takes the interdependence of partners into account by estimating the effect of one's own independent variable onto the own dependent variable (actor effect), but also the respective effect on the partner's dependent variable (partner effect), controlling for the person's own independent variable.

In summary, we (1) expected frequency of visits, sex during separation, and sex drive to be positively associated with sexual satisfaction, and sexual difficulties to be negatively related. We further hypothesized that just like in PRs (2) relationship satisfaction would contribute to

sexual satisfaction and (3) that both attachment anxiety and avoidance would be detrimental to sexual satisfaction. We expected (4) anxiety to moderate between relationship and sexual satisfaction, with high anxiety attenuating the link, and (5) raised the question whether dyadic interdependence is present in LDRs.

## Method

### Sample

A nationwide press release was published in Germany to encourage LDR partners and couples via newspaper advertisements, radio stations, and online blogs to participate in the study if they (1) had two separate households and (2) would have difficulty visiting the partner and returning back to their own residence in one day (see Dellman-Jenkins, Bernard-Paolucci, and Rushing, 1994). This definition was chosen to take relativity of distance depending on means of travel into account. It also avoids confounding LDRs with commuters, whose lifestyle has been shown to have different implications for their relationship (Anderson & Spruill, 1993; Bunker, Zubek, Vanderslice & Rice, 1992). Both individuals and couples completed the study online through the portal of the Department of Psychology of Humboldt University Berlin, Germany.

Because some participants had missings on the main measures, did not live in heterosexual relationships, or had one of the partner's data missing due to non-participation, they were excluded from the participant pool. For the couple sample, this left 75 couples from the 114 that had signed up, and for individuals 971 from the original 1353 participants were left.

For couples, the mean ages for men and women were 29.09 years (range = 18-49,  $SD = 7.54$ ) and 26.69 years (range = 19-46,  $SD = 6.78$ ), for individuals 29.09 years (range = 18-65,  $SD = 8.61$ ). Mean relationship length was 3.7 years ( $SD = 3.21$  years) for couples and 2.85 years ( $SD = 3.18$  years) for individuals. As a measure of distance between the partners, participants were asked to report the usual travel time needed to reach their partner on a scale ranging from 1 (*less than 1 hour*), 2 (*1-2 hours*), 3 (*2-4 hours*), 4 (*4-6 hours*), to 5 (*more than 6 hours*),  $M = 3.5$ ,  $SD = 1.1$  (individuals:  $M = 3.6$ ,  $SD = 1.1$ ).

### Measures

*Sexual satisfaction.* Participants completed the Global Measure of Sexual Satisfaction (GMSEX; Lawrance & Byers, 1995) that assesses overall sexual satisfaction in response to the question: "In general, how would you describe your sexual relationship with your part-

ner?” Participants answered on five 5-point bipolar scales: bad-good, unpleasant-pleasant, negative-positive, unsatisfying-satisfying, worthless-valuable, with higher scores indicating higher sexual satisfaction (couples’ Cronbach’s  $\alpha = .87$  for men,  $\alpha = .91$  for women, individuals’  $\alpha = .92$ ).

*Frequency of visits.* Participants indicated how often they saw their partner on average on a 5-point scale, ranging from 1 (*less than once per month*), 2 (*at least once per month*), 3 (*at least every two weeks*), 4 (*at least once per week*) to 5 (*several times a week*).

*Sex with the partner during separation.* To assess whether participants engaged in any kind of (perceived) sexual activities with their partner during the times of physical separation, we asked the following question: “During times when you are not together, do you have sex of any kind with your partner (e.g. phone sex or similar activities)?” with answers ranging from 1 (*not at all*) to 5 (*very often*).

*Sex drive.* Participants answered four self-generated questions regarding their sex drive that were derived following the SDQ (Ostovich & Sabini, 2004). One of the items was “How often do you think about sex or have sexual fantasies?”. Participants rated the respective frequency on a 5-point scale with higher scores indicating higher sex drive (couples’  $\alpha = .72$  for men,  $\alpha = .77$  for women, individuals’  $\alpha = .78$ ).

*Sexual difficulties.* We further asked participants to what extent they felt it was difficult for them to relate to their partner sexually at times when they were being face-to-face. The degree of difficulty was rated on a 5-point scale from 1 (*not at all difficult*) to 5 (*very difficult*).

*Relationship satisfaction.* We assessed relationship satisfaction with the German Version of the Relationship Assessment Scale (RAS; Hendrick, 1988) by Sander and Böcker (1993). The 7-item scale assesses overall relationship satisfaction, here on a 5-point scale, with items such as “How much do you love your partner?” and “To what extent has your relationship met your original expectations?”, with higher scores reflecting higher relationship satisfaction (couples’  $\alpha = .84$  for men,  $\alpha = .81$  for women, individuals’  $\alpha = .86$ ).

*Attachment.* Participants further completed a shortened version of the German Experiences in Close Relationships Questionnaire-Revised (Ehrental, Dinger, Lamla, Funken, & Schauenburg, 2009, original by Fraley, Waller, & Brennan, 2000). We reduced the original 36-item self-report questionnaire to a 20-item version by choosing the 10 highest-loading items as reported by Ehrental et al. (2009) for the anxiety and avoidance dimension, respectively. Examples of avoidance items are “I get uncomfortable when my partner wants to be very close” and “It helps to turn to my romantic partner in times of need” (reverse scored). Exam-

ples of anxiety items include “I worry that romantic partners won’t care about me as much as I care about them” and “I rarely worry about my partner leaving me“(reverse scored). Participants answered on a 7-point Likert scale, ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). Responses were then averaged across the 10 items for each dimension (couples’ anxiety:  $\alpha = .91$  for men,  $\alpha = .93$  for women, individuals’  $\alpha = .90$ ; couples’ avoidance:  $\alpha = .80$  for men,  $\alpha = .88$  for women, individuals’  $\alpha = .84$ ).

## Results

First, we addressed the hypotheses about main predictors and possible interdependence of partners in the couple sample. Means and standard deviations for all variables are displayed separately for men and women in Table 4-4-1. Sex differences were tested using paired t-tests. Significant differences on the study variables between men and women emerged for attachment avoidance and sex drive, with men scoring higher in both than women. The attachment anxiety means in our sample are somewhat higher than what previous studies have found, while the means for avoidance seem to be slightly lower than usual. In fact, Jimenez, Neberich, and Asendorpf (submitted) found that individuals in LDRs score significantly higher in anxiety and significantly lower in attachment avoidance than individuals in proximal relationships (partners living in the same household), although the effect sizes of these differences were small.

## Correlation among measures

Intercorrelations for the study variables as well as participant age and relationship length in years are shown in Table 4-4-2. Several associations are noteworthy. Sexual satisfaction was positively associated with relationship satisfaction and sex with the partner during separation and negatively with relationship length and sexual difficulties for both men and women. The positive association between sexual satisfaction and sex drive was significant for women only, while the correlation between frequency of visits was negative and significant for men only. Regarding attachment, men high on anxiety and avoidance tended to be less sexually satisfied, whereas for women only avoidance mattered. Anxiety and avoidance were also highly correlated with relationship satisfaction for both genders. While age had no significant associations with the main variables, relationship length was negatively related to sexual satisfaction and sex with the partner during separation and was therefore controlled for in subsequent analyses.

Considerable correlations between partners emerged for sexual satisfaction, indicating that if one partner scored high on sexual satisfaction, the other one tended to score high on sexual satisfaction as well. The same applied to relationship satisfaction and sexual difficulties. There was further relatively high agreement on the sex with the partner during separation and the frequency of visits variables. No significant correlation between partners emerged for sex drive, indicating that one partner's sex drive is unrelated to the other person's sex drive. Concerning attachment, anxiety showed a considerable correlation between partners, suggesting that highly anxious partners tended to be with someone who was also anxious. Avoidance showed a between-partner correlation as well, but not as high.

In summary, the correlational analyses indicated that the hypothesized predictors are related to sexual satisfaction in LDRs as expected and justify further analyses. The correlations further indicate the lack of independence of observations within dyads, suggesting that dyad should be the unit of analysis.

### Regression analyses predicting sexual satisfaction

In order to identify relevant predictors for sexual satisfaction in LDRs, we first conducted hierarchical regression analyses separately for men and women. In the first step, we entered relationship length in order to control for its influence on sexual satisfaction. The second step consisted of the participant's own sex drive, sexual difficulties, sex with the partner during separation, frequency of visits, relationship satisfaction as well as attachment anxiety and avoidance. Step 3 included partner's sex drive, sexual difficulties, sex during separation, frequency of visits, relationship satisfaction, attachment anxiety and avoidance. The results are displayed in Table 4-4-3.

*Women's sexual satisfaction.* For women, relationship length was negatively associated with sexual satisfaction. Surprisingly, only two other significant actor effects were found, namely sexual difficulties and relationship satisfaction. All other variables remained non-significant, and no significant partner effects emerged.

*Men's sexual satisfaction.* Like for women, relationship length was found to be a negative predictor of sexual satisfaction, and sexual difficulties and relationship satisfaction emerged as the only significant actor effects. Again, no significant partner effects were found.

In sum, apart from relationship length, sexual difficulties emerged as the only negative, and relationship satisfaction as the only positive actor effect for sexual satisfaction in both men and women. There was further support for the hypothesis that LDR partners might not influ-



ence one another as much as partners in proximal relationships, as the analysis was characterized by the absence of partner effects.

### Mutual-influence model

Using structural equation modeling, we therefore tested the model as a mutual-influence model (Kenny, 1996). In contrast to the APIM, the mutual-influence model assumes actor but no partner effects and mutual influence solely on the outcome variables. Men's and women's relationship satisfaction and sexual difficulties were the exogenous variables, and both gender's sexual satisfaction the outcome variables. All possible correlations between relationship satisfaction and sexual difficulties were included, as well as correlated disturbances for sexual satisfaction as proposed by Kenny (1996). Mutual influence of partners was assumed for sexual satisfaction, otherwise only actor effects were estimated. The model yielded very good fit,  $\chi^2(2) = .97, p = .62$ ; RMSEA = .0001; CFI = 1.0. Relationship length was not significant in the regression models' final steps and did not worsen model fit here when included as a predictor, however all paths and correlations associated with it remained non-significant. The variable was therefore not included in the final model. All paths were significant with two exceptions (see Figure 4-1). Here, when estimating all effects simultaneously, women's relationship satisfaction did not continue to be a significant predictor of women's sexual satisfaction. Second, although men's sexual satisfaction influenced women's sexual satisfaction, the reverse effect was not found to be significant. For women, 48 % of the variance in their own sexual satisfaction could be explained by the model, and men's relationship satisfaction and sexual difficulties accounted for a total of 43 % of the variance in their own sexual satisfaction.

To be sure that the model with the same variables would not serve the purpose better as an APIM than as a mutual-influence model, we estimated the respective APIM as a saturated model with all partner effects and no mutual influence on sexual satisfaction. However, none of the partner effects reached significance.

Finally, we explored sex differences in our model by testing nested models in which corresponding paths for men and women were set equal one pair at a time. Although all chi-square difference tests between the unconstrained and constrained models were somewhat close to significance, only one sex difference was marginally significant. The positive path from men's relationship satisfaction to men's sexual satisfaction was marginally significantly stronger than the respective path for women ( $X^2(1) = 3.21, p = .07$ ). Because the difference in

the parameter estimates between men and women seems to be rather large, it might be that the non-significance was due to the relatively small sample size.

### Predicting sexual satisfaction in the sample of individuals

As interdependence between LDR partners on the predictor variables was not existent or too small to be detected in the couple sample, we attempted a replication of the predictors in the much larger sample of individuals ( $n = 971$ ). Means, standard deviations, and intercorrelations are shown in Table 4-4. The correlation pattern was very similar to the one found in the couple data, with all proposed predictors being significantly correlated with sexual satisfaction. Relationship length was associated with more variables than in the couple data, and age, although not associated with sexual satisfaction, showed associations to relationship satisfaction and attachment avoidance and was therefore additionally controlled. Notably, partners who indicated to have sex with the partner during the separation had less sexual difficulties during visits. Sex drive was positively associated with sex with the partner during separation and anxiety, but negatively to avoidance, supporting our initial ideas when generating the hypotheses. Interestingly, frequency of visits was negatively correlated with sexual satisfaction, indicating that individuals who see their partners more often were less sexually satisfied.

In this sample we did find a significant sex difference in sexual satisfaction,  $t(969) = -2.27, p < .05$ , Cohen's  $d = -0.16$ , as well as in attachment avoidance,  $t(969) = 2.85, p < .01, d = 0.21$ , and sex drive,  $t(446) = 9.45, p < .001, d = 0.68$ , with women reporting higher scores in sexual satisfaction and lower scores in attachment avoidance and sex drive. We hence controlled for sex in the following analysis.

As this sample was sufficiently large to address the moderation hypothesis in addition to replicating the earlier findings, we conducted the hierarchical regression analysis as follows. In the first step, relationship length, age, and gender were included, followed by the predictors frequency of visits, sex with the partner during separation, sex drive and sexual difficulties in the second step. In the third step, we added the non-sexual variables relationship satisfaction, attachment anxiety and avoidance. Finally, the interaction between relationship satisfaction and both anxiety and avoidance was included in the fourth step. All variables were standardized prior to the analysis, therefore unstandardized and standardized regression weights are equal and only beta weights are reported (see Table 4-5). While age had a small significant contribution to sexual satisfaction, relationship length was confirmed as a negative predictor. Being male was also associated with lower sexual satisfaction. In step 2, although all predictors were significant, sexual difficulties was the most predictive by far. All predictors except

for frequency of visits and sex drive exerted their influence in the anticipated direction. The control and sexual variables alone were able to account for a total of 30% of the variance in sexual satisfaction. In step 3, adding relationship satisfaction and attachment resulted in incremental variance over and above the sexual predictors. Again, all predictors reached significance, with relationship satisfaction being the most powerful one from this block. As predicted, both anxiety and avoidance were negative predictors, whereas relationship satisfaction was a strong positive predictor. In the last block, the interaction of avoidance and relationship satisfaction was not significant as expected. The interaction of anxiety and relationship satisfaction reached significance, thereby confirming our hypothesis that anxiety has a moderating role in the link between relationship and sexual satisfaction. When plotting the association between relationship satisfaction and sexual satisfaction at low (1 *SD* below the mean) and high (1 *SD* above the mean) attachment anxiety, as proposed by Aiken and West (1991), the association remained significant in both cases. As depicted in Figure 4-2, the link was stronger for less anxious ( $\beta = .30, p < .001$ ) than for highly anxious participants ( $\beta = .11, p = .01$ ).

Lastly, we wondered whether we could also replicate the sex difference concerning the link between relationship and sexual satisfaction as found in the couple data. We found the interaction of sex and relationship satisfaction to be significant at  $\beta = .29, p < .001$ , indicating that the link was again stronger for men ( $\beta = .52, p < .001$ ) than for women ( $\beta = .23, p < .001$ ).

In summary, in this larger sample all hypothesized predictors contributed significantly to sexual satisfaction in this LDR sample, again with sexual difficulties emerging as the most influential negative, and relationship satisfaction as the most influential positive predictor. The moderator hypothesis was confirmed, indicating that for highly anxious individuals the link between relationship and sexual satisfaction is weaker than for low anxious individuals. Like before, the link between relationship and sexual satisfaction was also found to be weaker for women than for men.

## Discussion

Concerning our hypotheses, we found support for (1) that frequency of visits, sex with the partner during separation, sex drive, and sexual difficulties would be associated with sexual satisfaction in LDRs. We also found (2) relationship satisfaction and (3) both attachment anxiety and avoidance to be associated with sexual satisfaction. Further, (4) anxiety was found to moderate the link between relationship and sexual satisfaction, and (5) interdependence of LDR partners was found to be rather low.

## Predictors of sexual satisfaction in LDRs

*Relationship length.* Longer relationship length was associated with lower sexual satisfaction in both samples, more so than some of the hypothesized predictors. Previous studies have found the same association (Bodenmann, Ledermann, & Bradbury, 2007) and further that relationship duration is negatively associated with the frequency of sexual intercourse in PRs (Brassard, Shaver, & Lussier, 2007) and lower arousal, intimacy, and excitement (Birnbaum, 2007), which might explain the contribution of relationship length to lower sexual satisfaction. In the mutual-influence model, however, relationship length lost its significant influence.

*Frequency of visits.* Surprisingly, more frequent visits were associated with lower sexual satisfaction both in the individual sample as well as in the couple sample. This seems contrary to the idea that lack of opportunities is impairing sexual satisfaction in LDRs. Notably, in the individual sample frequency of visits only reached significance when relationship satisfaction was added to the model, indicating that the positive effects of frequent visits were suppressed by shared variance with relationship satisfaction. It is also possible that the frequency of visits in LDRs influences relationship outcomes in a similar manner as relationship length in PRs, namely in a negative way, as it can be assumed to make a large contribution to the degree of familiarity between the partners.

*Sex with the partner during separation.* Sexual contact with the partner during times not together was positively correlated with sexual satisfaction in both samples and also had a small positive effect when predicting sexual satisfaction in the individual sample. The influence might have been rather small because participants indicated to have sex with the partner during the separation infrequently (between  $M = 1.5$  and  $M = 1.7$  in both samples on a scale from 1-5). Alternatively, it might be a hint at the quality of sexual interactions outweighing the quantity, a notion that was supported by the findings concerning sexual difficulties and frequency of visits. Interestingly, sex with the partner during the separation was further associated with less sexual difficulties during visits.

*Sex drive.* For women only, sex drive was significantly and positively correlated with sexual satisfaction. In the couple sample, although not significant, the regression weight was again positive for women, but negative for men, which might explain the small negative  $\beta$  in the individual sample. It might be that men's significantly higher sex drive led to frustration about the low quantity of sexual encounters with their partner, whereas for women it motivated to use more possibilities for sexual interactions. In line with this, sex drive was also

associated both with more sex with the partner during separation and less sexual difficulties during visits.

*Sexual difficulties and relationship satisfaction.* Consistently, sexual difficulties encountered during visits were strongly associated with sexual satisfaction. In fact, this variable was found to be the most important predictor of sexual satisfaction for women in both samples, remaining the only significant predictor for them in the mutual-influence model. For men, it was the second most important predictor of sexual satisfaction after relationship satisfaction, which was also found to be a reliable predictor of sexual satisfaction across samples. In the mutual-influence model, it remained significant for men only, and in the individual sample the link between relationship and sexual satisfaction was found to be stronger for men than for women. Hence, while for men experienced own difficulty to relate to the partner sexually seemed to be an additional, yet important information aside from relationship satisfaction when judging sexual satisfaction, it was found to be the main source of information for women.

At first sight, this seems contrary to the previous finding of a closer relationship of sexual to relationship satisfaction for women than for men (Kisler & Christopher, 2008; Sprecher, 2002). However, if women's sexual satisfaction is anchored more in the relationship context than men's, it makes sense that sexual difficulties during visits directly decrease overall sexual satisfaction for them. As women have further been suggested to monitor the sexual costs in a relationship more closely than men (Kisler & Christopher, 2008) and be more sensitive and reactive to daily transactions (Feeney, 2001), the more global relationship satisfaction evaluation might not be considered by women when evaluating sexual satisfaction in LDRs. For men, while sexual difficulties matter, women's higher responsiveness to the partner's needs (Neff & Karney, 2005) and tendency to absorb problems rather than radiate them (Bodenmann, Ledermann, & Bradbury, 2007) possibly decrease its influence on sexual satisfaction and put general relationship quality more in focus.

The dominant role of sexual difficulties in our study suggests a) that the quality of sexual interaction matters more for the evaluation of sexual satisfaction in LDRs than the quantity, and b) that the evaluation of sexual satisfaction is to a large extent based on the few actual sexual interactions, and not on a generalized evaluation of the overall relationship or sex over the distance, as the low frequencies indicate.

*Attachment.* Both anxiety and avoidance were related to lower sexual satisfaction, although they only reached significance as predictors in the individual sample where both variables'

contribution was rather small. Maybe attachment is not as systematically connected to sexual satisfaction in LDRs as in PRs. Highly anxious individuals might seek the fulfillment of their need for closeness and reassurance in a domain other than sexuality in LDRs, and highly avoidant individuals might be relieved of the perceived pressure for sexual intimacy. As the specific causes for the link between attachment and sexual satisfaction are still unclear (Butzer & Campbell, 2008), this remains speculative.

The weaker link between relationship and sexual satisfaction for highly than low anxious participants supported our hypothesis that highly anxious individuals' tendency to monitor and emphasize recent relational events when evaluating relationship quality leads to a stronger separation of sexual and relationship satisfaction in LDRs. In PRs, in contrast, the two constructs might be harder to differentiate for highly anxious (Butzer & Campbell, 2008).

On a last note, the interaction of anxiety and avoidance was not addressed in the couple sample as it was not large enough to insure adequate statistical power and to obtain a good representation of all combinations of secure and insecure pairings. We did, however, examine it in the regression analysis of the individual sample where it did not yield significant results and was therefore left out.

### Interdependence of partners

One important result from this study concerns the absence of partner effects in the couple sample. According to Kenny and Cook (1999), substantial partner effects suggest that partners are part of an interdependent system, where the degree of interdependence moderates the size of the partner effects. Regarding PRs, partner effects have for example been found for attachment regarding the prediction of sexual satisfaction (Butzer & Campbell, 2008) among others.

Despite the considerable between-partner correlations on almost every variable, only actor effects reached significance both in the regression analyses and the mutual-influence model, indicating that participants' sexual satisfaction was not significantly affected by their partner's predictors of sexual satisfaction. We cannot exclude the possibility that there were partner effects that we could not detect because they were rather small. Still, these findings suggested rather low to missing interdependence among LDR partners.

However, there was support for a direct influence on the outcome variable, suggesting reciprocal causation or feedback (Kenny, 1996). Specifically, men's sexual satisfaction influenced women's sexual satisfaction, whereas the reverse was not found to be significant. The reason

might again be women's aforementioned stronger vulnerability and reactivity to recent partner behavior, especially when related to potential own costs of the sexual relationship. Alternatively, men might simply be more open or readable regarding their own sexual satisfaction than women.

Lastly, the correlation between the error terms of sexual satisfaction with the influence of the predictors partialled out remained significant. This indicates unexplained variance not accounted for by the predictors and leaves the possibility open that there might be interdependence among the partners that we did not get a hold of in this study.

### Limitations and directions for future research

The results of this study need to be interpreted in light of its limitations. First, our recruitment strategy might have facilitated self-selection bias. Our samples might be composed of couples and individuals that are rather satisfied with their relationship, suggesting being careful when generalizing the findings. Second, the samples were recruited over the internet, which enabled us to have both couple members participate at the same time, and allowed for answering delicate questions concerning the participants' sexuality in private settings. We did include incentives to ensure that participants answered reliably and truthfully, however we cannot exclude the possibility that that was not always the case. Gosling, Vazire, Srivastava, and John (2004) stated that web-based studies are not significantly impaired by unserious or repeated responding, and the good agreement between partners in the couple sample is a hint that self-presentation biases might not have played a major role. Also, as the study was cross-sectional, we cannot make causal inferences. Finally, we used several single-item measures. Multi-item measures might better reflect the respective construct and can be evaluated for reliability.

However, this study intended to pave the way for further investigation by assessing a broad range of possible predictors of sexual satisfaction in LDRs. Although we could explain about 50% of the variance in sexual satisfaction, there might be other predictors not considered in this study that could enhance our understanding of sexuality in LDRs. Now, knowing the importance of actual sexual interactions between LDR partners, future research could clarify the dynamics of sexual difficulties and perceived quality of sexual interactions against the actual frequency of sex distributed over times apart and together. Such research could help to explain the sex differences found here and point to developmental mechanisms by which sexual satisfaction in LDRs is constructed. Additionally, it would allow for a comparison with PRs in estimating the respective importance of predictors and compare the dynamics of sexual satisfaction for both types of relationship.

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**Table 4-1: Means, standard deviations, and paired sample *t* tests of the study variables**

Study variables	M (SD)		<i>t</i> paired
	Men (n = 75)	Women (n = 75)	
Sexual satisfaction	4.47 (0.66)	4.43 (0.73)	-.48
Relationship satisfaction	4.16 (0.54)	4.18 (0.56)	.44
Attachment anxiety	2.61 (1.30)	2.84 (1.39)	1.37
Attachment avoidance	1.93 (0.65)	1.70 (0.80)	-2.19*
Sexual difficulties	1.60 (1.05)	1.72 (1.05)	.81
Sex drive	3.50 (0.56)	3.09 (0.60)	-4.52***
Sex with the partner during separation	1.52 (0.74)	1.61 (0.94)	1.02
Frequency of visits	2.73 (1.00)	2.61 (1.08)	-1.76

**Note.** \*  $p < .05$ . \*\*\*  $p < .001$ .

**Table 4-2: Intercorrelations for sexual satisfaction, relationship satisfaction, attachment dimensions, sexual difficulties, sex drive, sex with partner during separation, frequency of visits, age, and relationship length in years**

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. Sexual satisfaction	<b>.46***</b>	.48***	-.10	-.44***	-.65***	.10	.25*	.39***	.10	-.27*
2. Relationship satisfaction	.57**	<b>.61***</b>	-.54***	-.71***	-.51***	.12	.24*	.05	.09	-.08
3. Anxiety	-.25***	-.47***	<b>.41***</b>	.26*	.27*	.10	-.04	.11	-.03	-.19
4. Avoidance	-.30**	-.58***	.23*	<b>.24*</b>	.56***	-.07	-.08	-.06	-.15	.04
5. Sexual difficulties	-.45***	-.34**	.14	.23*	<b>.26*</b>	-.04	-.11	-.38***	-.20	.09
6. Frequency of visits	-.24*	-.19	.14	.12	.10	<b>.84***</b>	-.04	.02	.11	-.05
7. Sex with the partner during separation	.36**	.28*	-.14	-.12	-.25*	-.23*	<b>.58***</b>	.29*	.03	-.19
8. Sex drive	-.02	.05	.04	-.19	-.27*	-.01	.07	<b>.09</b>	.03	-.17
9. Age	.004	-.08	-.005	.04	.19	.16	.03	-.11	<b>.84***</b>	.50***
10. Relationship length	-.29**	-.21	-.06	.06	.18	.04	-.28*	-.10	.34**	---

**Note.** Correlations for men appear below the diagonal, whereas correlations for women appear above the diagonal. Correlations along the diagonal are between dyad members. \*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

**Table 4-3: Hierarchical regression analyses for men's and women's sexual satisfaction.**

	W sexual satisfaction	$\beta$	$\Delta R^2$	M sexual satisfaction	$\beta$	$\Delta R^2$
Step 1:	Relationship length	-.27*	.07*	Relationship length	.29**	.09**
Step 2:	W sex drive	.13	.47***	M sex drive	-.14	.38***
	W sexual difficulties	-.48***		M sexual difficulties	-.30**	
	W sex with partner during separation	.08		M sex with partner during separation	.12	
	W frequency of visits	.03		M frequency of visits	-.10	
	W relationship satisfaction	.28*		M relationship satisfaction	.40**	
	W anxiety	.14		M anxiety	.01	
	W avoidance	.02		M avoidance	-.00	
Step 3:	M sex drive	-.07	.05	W sex drive	-.00	.04
	M sexual difficulties	-.03		W sexual difficulties	-.16	
	M sex with partner during separation	-.17		W sex with partner during separation	.15	
	M frequency of visits	-.05		W frequency of visits	.15	
	M relationship satisfaction	.10		W relationship satisfaction	.01	
	M anxiety	-.16		W anxiety	.03	
	M avoidance	-.01		W avoidance	.15	

**Note.** M = men, W = women. Coefficients are shown only for the point at which they first entered the regression equation. \*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

**Table 4-4: Correlations, descriptive statistics, and internal consistencies of all measures**

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. Sexual satisfaction	<b>.92</b>	.42***	-.16***	-.43***	-.50***	-.10**	.24***	.24***	.01	-.21***
2. Relationship satisfaction		<b>.86</b>	-.48***	-.59***	-.32***	.01	.10**	.10***	-.15***	-.09**
3. Anxiety			<b>.90</b>	.21***	.12***	-.03	.01	.10**	.01	-.16***
4. Avoidance				<b>.84</b>	.37***	.04	-.12***	-.09**	.13***	.08*
5. Sexual difficulties					---	.05	-.21***	-.24***	-.02	.17***
6. Frequency of visits						---	.23***	-.03	.07*	.03
7. Sex with partner during separation							---	.23***	.03	-.17***
8. Sex drive								<b>.78</b>	.03	-.22***
9. Age									---	.28***
10. Relationship length										---
Mean	4.43	3.98	3.12	1.94	1.55	2.49	1.72	3.23	29.1	2.86
SD	0.78	0.71	1.44	0.87	0.96	.10	1.08	0.67	8.61	3.16

**Note.** Internal consistencies are printed bold along the diagonal. No  $\alpha$  can be calculated for frequency of visits, sexual difficulties, sex with partner during separation, relationship length and age \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .



**Table 4-5: Hierarchical regression analysis predicting sexual satisfaction**

Variable	$\beta$	$\Delta R^2$	Total adj. $R^2$
Step 1		.06***	.05***
Age	.09***		
Sex (1=male, 0=female)	-.09***		
Relationship length	-.13***		
Step 2		.25***	.30***
Sex drive	-.10***		
Sexual difficulties	-.31***		
Sex with partner during separation	.08**		
Frequency of visits	-.06*		
Step 3		.09***	.39***
Relationship satisfaction	.20***		
Attachment anxiety	-.07*		
Attachment avoidance	-.13***		
Step 4		.01***	.40***
Anxiety x relationship satisfaction	-.11***		
Avoidance x relationship satisfaction	-.04		

**Note.** \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ . Coefficients are shown only for the point at which they first entered the regression equation.

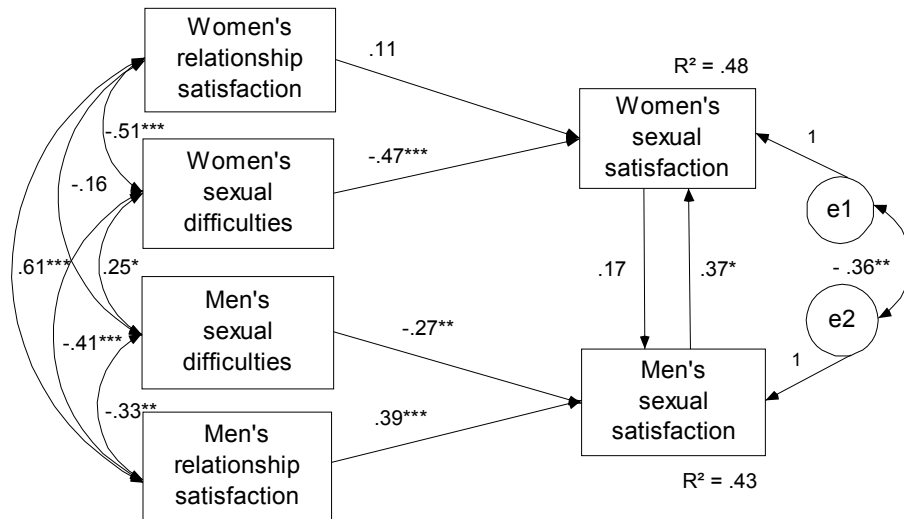
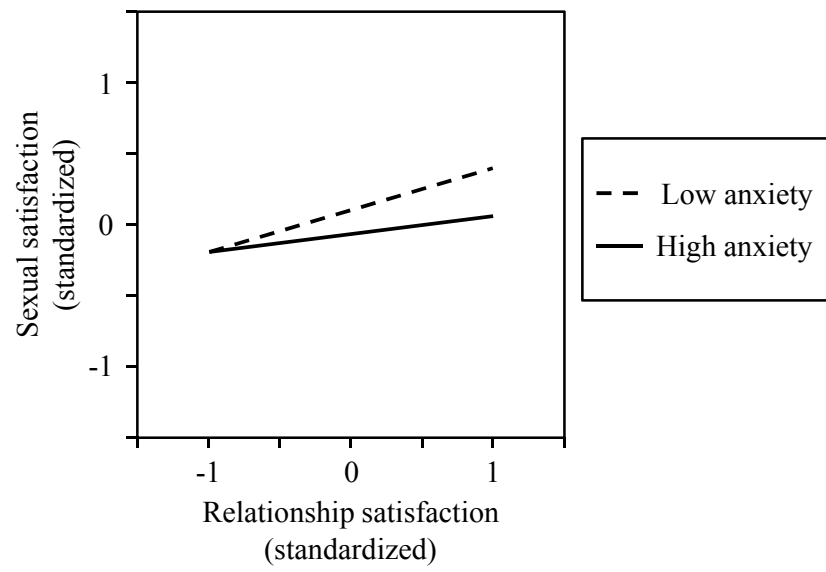


Figure 4-1: Standardized parameter estimates for the mutual-influence model.



**Figure 4-2: Influence of relationship satisfaction on sexual satisfaction for high and low attachment anxiety**