# The Relationship between Attachment Style and Placement of Parents in Adults' Attachment Networks over Time

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 (**7,788** words – excluding abstract, keywords, references, tables and figures)

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## Abstract

Using a bull's-eye hierarchical mapping technique (HMT), the present study examined placement of parents in adults' attachment networks over time. We hypothesised that attachment style would predict distance at which network members (mother, father, romantic partner) would be placed from the core-self over time. Participants completed the HMT on two occasions, 12-months apart. Attachment style explained unique variance, beyond that accounted for by individual and relationship characteristics, in distance of mother, father, and partner concurrently and for mother over time. Unsatisfactory attachment relationships with father and partner and those marked by higher attachment insecurity were more likely to be excluded from attachment networks over time. Findings suggest that attachment style, relationship quality, romantic relationship status, and parents' marital status determine the placement of parents in adults' attachment networks.

Keywords: attachment; attachment networks; parents; attachment style; longitudinal

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**~~The Relationship between~~ Attachment Style ~~Predicts~~ and Placement of Parents in Adults'**

**Attachment Networks over Time**

Attachment is a life-long phenomenon (Bowlby, 1969) and parents remain attachment

figures into adulthood (Ainsworth, 1985). Beginning in middle childhood, attachment functions

gradually transfer from parents to peers beginning with proximity-seeking, then safe haven

(providing care to reduce distress), and ending with the secure base (supporting exploration)

(Seibert & Kerns, 2009; Zeifman & Hazan, 2010). The reorganization of attachment to parents is

prompted by two psychosocial challenges in adolescence: establishing autonomy and achieving

interdependence (Collins & Steinberg, 2006).  One outcome of these normative developmental

processes is that peers are included in the attachment network, the group of relationships in

which the individual (seeks to) experiences comfort and security with attachment figures

(Ainsworth, 1985).

Within the attachment network, attachment figures are organized in a hierarchical

structure (e.g., Rowe & Carnelley, 2005; Trinke & Bartholomew, 1997). Studies indicate that

attachment networks are fluid and dynamic in structure, changing over time (e.g., Friedlmeier &

Granqvist, 2006; Mayseless, 2004; Zeifman & Hazan, 2010). The primary, or most important,

attachment figure occupies the uppermost position above a number of subsidiary figures. For

older adolescents and adults, mothers tend to occupy the first or second position, after romantic

partners (e.g., Rosenthal & Kobak, 2010; Trinke & Bartholomew, 1997). In contrast, fathers are

lower down in the hierarchy and are more likely than mothers to be relinquished as peer

attachments are added to the network (Rosenthal & Kobak, 2010).  Indeed, fathers - and mothers

- do not feature in the attachment hierarchies of some adolescents and adults (e.g., Antonucci,

Akiyama, & Takahashi, 2004; Freeman & Brown, 2001).

In addition to age and romantic relationships status, theory (Ainsworth, 1985) and

empirical findings suggest that attachment style is a key factor in shaping the organization of

parental attachment bonds in the attachment network (Rowe & Carnelley, 2005) and the transfer

of attachment to peers (Friedlmeier & Granqvist, 2006; Mayseless, 2004;). Yet, because much

research to date on attachment hierarchies is cross-sectional in nature, little is known about the

extent to which attachment style explains parents' movement over time within the attachment

network relative to individual (i.e., age, sex) and other relationship characteristics (e.g.,

satisfaction with the parent-child relationship). Moreover, a question that remains unaddressed is

why some parents are jettisoned from the network: Are there differences between those parental

attachments that remain in the attachment network and those that are dropped? The present study

used a longitudinal method to address these theoretical questions.

**Attachment Style and Organization of the Attachment Network**

Bowlby (1973) proposed that attachment experiences are internalized in mental

representations, named internal working models. These representations are used to organize and

shape affect, behavior and cognitions in close relationships (Collins, Guichard, Ford, & Feeney,

2004). Underlying these representations are attachment styles, which reflect individual

differences in cognitions, affect, and behavior. Attachment styles are commonly assessed along

two dimensions. Attachment anxiety reflects concern about abandonment, rejection, and not

being loved. Attachment avoidance reflects a desire for independence and discomfort with

closeness (Brennan, Clark, & Shaver 1998). Individuals who are high on one (or both)

dimensions are considered 'insecure' and those low on both 'secure'. Attachment styles are also

assessed on different levels of specificity, reflecting the idea that working models vary in their

level of abstraction (Collins & Read, 1994). General attachment styles reflect beliefs and

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expectations about attachment relationships in general whereas relationship-specific styles reflect cognitions about a given relationship partner.

Attachments that provide comfort and security are preferred and sought out in times of need (Trinke & Bartholomew, 1997). Similarly, Rowe and Carnelley (2005) found that network members with whom participants had a secure (versus insecure) attachment style were placed higher in the attachment hierarchy. Further, participants with a general secure attachment style placed network members with whom they had a secure (versus dismissing-avoidant) style higher in the hierarchy.

It follows that attachment insecurity is likely to shape parents' placement in attachment networks over time. Research has shown that attachment insecurity and less optimal caregiving histories affect the transfer of attachment functions from parents to peers over time. Anxious individuals hyperactivate proximity-seeking. In their close relationships, they seek to minimize distance, cognitively and behaviorally, and desire a merger between the self and other (Mikulincer & Shaver, 2007). Friedlmeier and Granqvist (2006) found that adolescents high in general attachment anxiety and who reported more insecure attachment histories (more rejecting, distant, and inconsistent parenting) with mother, but not father, experienced more and faster transfer from parents to peers over 12-15 months. Thus, individuals high in anxiety with parents should be more likely to move the parent or jettison them from the network over time. In contrast, avoidant individuals inhibit the primary attachment strategy of proximity-seeking by using deactivating strategies to maintain distance, control, and self-reliance in their relationships (Mikulincer & Shaver, 2007, p. 41). Friedlmeier and Granqvist (2006) found that adolescents high in general attachment avoidance and who reported more insecure attachment histories with mother, but not father, experienced less transfer from parents to peers over time. In a sample of

Israeli men who had left home for military service, Mayseless (2004) found that men who were more avoidant sought parents less and peers more over 6-months. Although parents, in general, remain central in the attachment network, individuals high in avoidance might be most likely to create emotional distance from their parents or jettison parents from the attachment network over time. In support of this, Gillath, Johnson, Selcuk and Teel (2011) found that attachment avoidance positively predicted adults' tendency to terminate social ties.

**Other Predictors of the Organization of the Attachment Network**

Although we expect attachment style to be the most important factor, research suggests individual and relationship characteristics should also shape the organization of attachment networks over time. For example, Rosenthal and Kobak (2010) reported gender differences in the hierarchy of college students: Women's mothers were placed higher in the hierarchy than men's, and fathers were placed higher in the hierarchy of men than women (Rosenthal & Kobak, 2010). These findings may reflect differences in gender socialization or in perceptions of what closeness entails (Feeney, 1999). Rosenthal and Kobak (2010) also found that adolescents from intact (versus non-intact) families placed parents higher in the hierarchies. Similarly, Rowe and Carnelley (2005) found that parents' placement within the network differed by parents' marital status: divorced (versus married) parents were positioned at a greater distance from each other.

Relationship characteristics that impede the ability to achieve comfort and security should also influence organization of adults' attachment networks. Relationships marked by dissatisfaction, conflict, and inadequate support might be more likely to be removed from the network over time. For example, Carnelley, Julal, Hepper, and Rowe (2008) found that lower perceived maternal responsive care was associated with mothers being placed ~~further from the core self.~~ lower in the hierarchy. Yet, even unsatisfactory attachment bonds may remain in

adults' networks. Milyavskaya and Lydon (2013) found that although attachment figures in

insecure (compared to secure) relationships fulfilled fewer attachment functions, there were no

differences in adults' frequency of contact or communication across a week.

**Assessing Organization of the Attachment Network over Time**

Although parents might be less preferred as attachment figures with age (Markiewicz,

Lawford, Doyle, & Haggary, 2006; Rosenthal & Kobak, 2010) and as compared to romantic

partners (Heffernan, Fraley, Vicary, & Brumbaugh, 2012; Trinke & Bartholomew, 1997),

research tells us little about the symbolic importance of adolescents' and adults' relationships

with their parents. Parents may continue to be psychologically available via internal working

models (Ainsworth, 1989; Cicirelli, 2010). Diagrammatic measures are good at capturing deeply-

rooted feelings of closeness (Aron, Aron, & Smollan, 1992). One such measure is the bull's-eye

hierarchical mapping technique (HMT; Kahn & Antonucci, 1979; as cited in Antonucci, 1986).

The HMT is a diagrammatic tool (see Figure 1 below), originally developed to assess

INSERT FIGURE 1 ABOUT HERE

adults' social support networks (Antonucci, 1986), that consists of three concentric circles. The

smallest most central circle represents the core-self and the other circles represent varying levels

of closeness. The inner circle represents people one feels closest to and is thought to represent

attachment relationships (Antonucci et al., 2004; Rowe & Carnelley, 2005).  Participants position

their significant others on the bull's-eye in a way that is meaningful to them. Rowe and

Carnelley (2005) found that distances between the core-self and each significant other were

predicted by measures of subjective, but not objective, closeness and correlated with scores on

the Attachment Network Questionnaire (Trinke & Bartholomew, 1997), a measure of adults'

attachment hierarchies. Rowe and Carnelley (2005) did not find age or romantic relationship

status differences in the distances of mother and father, consistent with the view that adolescents

do not relinquish their attachments to parents; rather parents remain central in attachment

networks. The HMT successfully captures the hierarchical organization of attachment networks

and is sensitive to the psychological meaningfulness of parents. Yet, the extent to which the

HMT captures the dynamic nature of the attachment hierarchy over time remains to be tested.

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Insert Figure 1 here

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**Present Study**

Extant longitudinal research has not comprehensively addressed the factors beyond

concurrent attachment style that are associated with parents' movement in the attachment

network over time. Herein we investigated the dynamic nature of attachment networks by

examining placement of parents within networks across two waves, 12-months apart. Movement

was assessed as the distance at which mother and father were placed from the core-self on the

HMT over time. We examined the relative ability of relationship-specific attachment style to

predict parents' placement concurrently and over time, after accounting controlling for individual

and other relationship characteristics. For comparison, we also examined romantic partner's

movement in attachment networks over time.

Given the age of our sample, we expected to observe differences in the distances of

mother and father from the core-self as a function of relationship status and for romantic

partners to be placed closer to the core-self than mother and father. In addition, we expected to

replicate findings of Rowe and Carnelley (2005). Firstly, married parents would be placed closer

to the core-self and to each other on the HMT than separated parents. Secondly, we expected

relationships marked by attachment insecurity (high avoidance, high anxiety) to be placed further

from the core-self. In addition, we made the following novel predictions:

### *Hypothesis 1a and 1b*

Relationship quality (i.e., negative affect, relationship satisfaction, use as an attachment

figure, perceived responsive care, psychological presence of parent in one's daily life, frequency

of contact[1]) should predict distance of network members from the core-self (a) concurrently and

(b) over time. Unsatisfactory attachment bonds will be placed further from the core-self and

moved further from the core-self over time, respectively.

### *Hypothesis 2*

Relationship-specific attachment style should account for unique variance in distance

from the core-self, beyond that accounted for by relationship quality, age, gender, and romantic

relationship status.

### *Hypothesis 3*

Relationship-specific attachment style should predict distance from the core-self over

time after accounting for individual and relationship characteristics. Relationships marked by

attachment insecurity at Wave 1 will be moved further from the core-self over time.

Some adults exclude mothers and fathers from their attachment networks (e.g., Doherty

& Feeney, 2004; Freeman & Brown, 2001; Trinke & Bartholomew, 1997).  Yet the question of

why some parents are ~~sometimes~~ jettisoned from attachment networks over time has not been, to

our knowledge, addressed. We examined the differences in attachment style and relationship

quality between parents that were included in the attachment network over time (at both waves)

and those that were dropped (included in the first wave, only). In addition, we used a directed

approach to content analysis (Hsieh & Shannon, 2005) to explore reasons for keeping and

dropping parents from their attachment networks over time. [2]

## Method

### Participants

Volunteers ($N = 403$) from three universities in England participated in Wave 1.  Only data from participants who included their mother ($n = 348$), father ($n = 299$), or both parents ($n = 291$) on the HMT were analyzed. Across these subgroups, the majority of participants was female (77-78%), British (90-91%), and heterosexual (96%). Age ranged from 17 to 59 years ($M = 20$; *Median* = 19).  When both parents were included, most were married (74%). Mean age at parental divorce was 10.1 years ($n = 66$; $SD = 6.06$). Two-hundred-and-five participants were currently in a romantic relationship ($M$ length = 2.52 years; 8 were missing), with the majority dating one person seriously (69%).

Approximately 12-months after Wave 1, 155 participants (39%) returned to participate in Wave 2. Women were 5.20 times more likely to return than men, $\chi2$ (1) = 6.53, $p = .011$. The majority was female (84%) and British (88%). Age ranged from 18 to 42 years ($M = 20$; *Median* = 20). Returning participants were 1.97 years younger than non-returners ($t$ (397) = 3.62, $p < .001$; Levene's $F = 6.67$, $p = .010$). For distance over time analyses, only data from participants who included their mother ($n=138$), father ($n=119$), and partner ($n=68$) on the HMT at Wave 1 were used. Participants that included their mother and father on the HMT at Wave 1, but who did not return for Wave 2 were older than those that did return (mother: $M = 21.4$ vs. $M = 19.9$, $t$ (346) = 2.75, $p = .006$; father: $M = 21.1$ vs. 19.6, $t$ (297) = 2.96, $p = .003$). Returning and non-retuning participants did not differ significantly on any of the mother ($p$s > .22), father ($p$s > .09), or partner relationship variables ($p$s > .09).

### Wave 1 Materials

***Demographics*** Participants reported gender, age, nationality, sexual orientation, and parents' marital status.

### Network Members

Using the Modified Social Network Inventory (MSNI; Perl & Trickett, 1988), participants listed up to 10 persons with whom they had a "close relationship, regardless of whether this relationship is positive, negative or mixed." For each person, participants provided information about the relationship (relationship type, time known).

### Attachment Networks

The WHOTO (Fraley & Davis, 1997) is a 6-item measure that assesses use of a target person as an attachment figure. Participants listed, in order of importance, whom they sought to fulfil proximity-seeking, secure base, and safe haven needs. Each component was assessed with two items. Following Fraley and Davis's (1997) scoring system, scores ranged from 0 (person was not listed for any items) to 3 (person was listed for one or both items for all three functions). Higher scores indicated a greater propensity to use the person as an attachment figure.

### Attachment Dimensions

We used the Experiences in Close Relationships – Relationship Structures measure (Fraley, Heffernan, Vicary, & Brumbaugh, 2011) to assess relationship-specific attachment styles with mother, father, romantic partner, and best friend (not included in the current analyses). Participants rated the extent to which they agreed (from 1 = *strongly disagree* to 7 = *strongly agree*) with items assessing attachment avoidance (6-items) and anxiety (3-items) for each figure. The ECR-RS is a reliable measure and shows convergent and divergent validity (Fraley et al., 2011). Higher scores indicated greater attachment anxiety and avoidance.

### Responsive Caregiving

We selected 12-items from the Caregiving Questionnaire (Kunce & Shaver, 1994) to assess perceptions of responsive care from each of the four relationship partners. Four items were selected from the sensitivity-insensitivity, proximity-distance, and cooperation-control subscales (sample: "When I want or need a hug, this person is glad to provide it."). Participants responded on a 6-point scale (1 = *not at all descriptive* to 6 = *extremely descriptive*). Higher scores indicate greater perceived responsive care.

### *Relationship Satisfaction*

Participants completed the 3-item relationship satisfaction subscale from the Perceived Relationship Quality Components Inventory (Fletcher, Simpson, & Thompson, 2000) for each relationship, using a 7-point scale (1 = *not at all* to 7 = *extremely*). Higher scores indicated greater relationship satisfaction. This brief measure is reliable, shows high face validity, and is useful for measuring evaluations in specific relationships (Fletcher et al., 2000).

### *Negative Affect*

We took two items from measures of parental conflict (Peterson & Zill, 1986) and negative affect within the family (Moos & Moos, 1986) to assess anger and resentment and frequency of arguments in each relationship. Responses were made on a 5-point scale (anchors varied). Items were moderately correlated for each attachment figure ($r$s > .161, $p$s < .001). Higher scores indicated more negative affect in the relationship.

### *Frequency of Parent-Child Contact*

Using 6 items from Sorokou and Weissbrod (2005), participants indicated the frequency of self- and parent-initiated contact for need (e.g., "after you have expressed a problem to her"; mother-initiated) and non-need (e.g., "when there is no particular reason other than simply to

touch base") contact (1 = *never* to 5 = *frequently*). Higher scores indicated more frequent

initiated contact.

### *Psychological Presence*

One item from the Nurturant Fathering (Finley & Schwartz, 2004) and Mothering

(Finley, Mira, & Schwartz, 2008) scale was used to assess parents' psychological presence: "As

you go through your day, how much of a *psychological presence* does your father (mother) have

in your daily thoughts and feelings?". Participants responded on a 5-point scale (1 = *always there*

to 5 = *never there*). Higher scores indicated *less* psychological presence.

### *Hierarchical Mapping Technique*

We used the HMT (Antonucci, 1986; Rowe & Carnelley, 2005) to assess distance from

the core-self (DCS) of network members. The central and smallest of the three concentric was

labeled, 'Me'. Participants were given stickers (18mm diameter) to represent each network

member and instructed to arrange the people in a way that was personal to them. Distances

between the core-self and network members were measured in millimetres. Higher values reflect

a greater distance, i.e., less closeness, between the participant and network member.

### **Wave 2 Materials**

### *Distance from the Core-self*

Participants first completed the MSNI, generating a new list of people. Next, they

completed a computerised version of the HMT. Distances between the core-self and network

members were transformed into mm.

### *Change in Attachment Network Members*

Participants were presented with the MSNI list they had produced at Wave 1. Participants

indicated whether they had included each Wave 1 person on their Wave 2 list and briefly

described why they had or had not kept the person on the list. For the purposes of this study, we focus only on responses regarding mother and father.

### *Reasons for Keeping and Dropping Parents from the Attachment Network*

Based on discussions amongst experts in adult attachment research (see Footnote 1), we identified 4 reasons for keeping and dropping a person from the attachment network (see Table 106). Participants indicated their agreement with each (1 = *strongly disagree* to 7 = *strongly agree*). Only responses for mother and father are discussed here. Responses to "Hope to repair" and "hope might be there for me someday" were positively correlated for each parent (mother: *r* = .856, *p* < .001; father: *r* = .920, *p* < .001).

### **Procedure**

At each Wave, participants gave informed consent before completing the measures in individual cubicles. At Wave 1, all measures were counterbalanced. At Wave 2, the MSNI and HMT were completed first and the other measures were counterbalanced. At the end of each Wave, participants were debriefed and participants at two universities received participation credits.[2]

### **Content Analysis**

We used a directed approach to content analysis (Hsieh & Shannon, 2005) to explore why parents are sometimes jettisoned from attachment networks over time. Directed content analysis uses formal theory as a basis for the coding scheme (Potter & Levine-Donnerstein, 1999). Thus, we referred to attachment theory, the Investment Model (Rusbult, Martz, & Agnew, 1998), and relationship maintenance and dissolution research to generate a list of potential themes.

We first generated a preliminary list of factors related to attachment figure use (e.g., safe

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haven support), descriptions of attachment relationships (e.g., caregiving, closeness, intimacy), and factors related to relationship maintenance and dissolution (e.g., anger, satisfaction). Next, we added to and refined the list following discussion and reading of the open-ended responses as a team, including three research assistants who were blind to the study's hypotheses. Our focus was on the manifest content in participants' responses (Potter & Levine-Donnerstein, 1999). After five iterations, we finalized a taxonomy of 12 themes. Two themes (perceived closeness; caregiving/social support) were for reasons for keeping a person in the attachment network and 10 themes (perceived rejection or resentment; trust; relationship dissatisfaction; change in physical proximity or contact; change in psychological availability; change in similarity; conflict; relationship dissolution; change in quality of caregiving; and, quality of alternatives) for reasons for dropping a person from the network. Four trained research assistants (all were blind to our hypotheses; two were involved in the initial coding process) coded for the presence or absence of each theme. After reviewing the coding, eight themes had very low use in responses for mother and father and were not considered further. Inter-rater reliability was acceptable (Krippendorff's alpha > .700, $M$ = .780).

## Results

### Data Preparation

Outliers ($z$ scores ±3.29$SDs$) and missing data were replaced.[3] Analyses were repeated with and without the missing data (Tabachnick & Fidell, 2013).[4]

### Parents' Marital Status and Distances on the HMT

Table 1 displays the average distances of attachment figures and between parents as a function of their marital status. Consistent with our expectations, romantic partners were placed significantly closer ($M$ = 20.6 and, $M$ = 20.7, respectively, $SD$s = 12.2) to the core-self than

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parentsmother ($M = 27.0$, $SD = 15.9$), $t(179) = 4.52$, $p < .001$, and father ($M = 36.2$, $SD = 19.4$),

$t(149) = 8.60$, $p < .001$.  Partially replicating Rowe and Carnelley's (2005) findings, there were

significant differences in distances of father, but not mother, as a function of parents' marital

status. Separated fathers ($M = 42.5$, $SD = 23.0$) were placed further from the core-self than

married fathers ($M = 32.4$, $SD = 17.1$), $t(104) = -3.49$, $p < .001$. Distances of separated mothers

($M = 26.1$, $SD = 16.1$) did not differ significantly from those of married mothers ($M = 25.9$, $SD =$

15.9), $t(104) = -0.096$, $p = .924$. Further, participants with married parents positioned their

parents closer together ($M = 31.3$, $SD = 18.0$) than participants with separated parents ($M = 49.1$,

$SD = 28.9$), $t(104) = -4.92$, $p < .001$.

**Attachment Style as a Predictor of Distance from the Core-Self**

To test Hypotheses 1a and 2a we conducted hierarchical regression analyses to examine

whether relationship-specific attachment style predicted distance from the core-self, beyond

individual and relationship characteristics.  DCS of mother, father, and partner were the criterion

variables. At Step 1, age, gender (1=female, 2=male), romantic relationship status (0=single;

1=in relationship; mother and father analyses, only) and university (mother analyses, only) were

entered.[5] At Step 2 perceived responsive care, negative affect, relationship satisfaction, use as an

attachment figure, and self- and parent-initiated need- and non-need-based contact and

psychological presence of parent (mother and father analyses only), were entered. At Step 3,

relationship-specific anxiety and avoidance were entered. Each analysis was repeated with Steps

2 and 3 reversed to explore the amount of variance in distance that was uniquely explained by

attachment style (see Supplemental Materials for details). Descriptive statistics, reliability

coefficients, and correlations for mother, father, and partner variables are reported in Tables 21

below, 3, and 4, respectively.

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*Mother*

Step 1 was significant (see Table 52) as Table 2 shows below.

Older participants and men placed mother further from the core-self than did younger

participants and women, respectively. Notably, romantic relationship status was not a significant

predictor of mother's distance. Step 2 was significant. Participants who reported less

psychological presence, less frequent self-initiated non-need-based contact, lower propensity to

use mother as an attachment figure, lower perceived responsive care, lower relationship

satisfaction, and more frequent mother-initiated non-need-based contact placed their mother

further from the core-self. At Step 3 attachment style with mother explained additional variance

in mother's distance, beyond that explained by the individual and relationship characteristics. As

predicted, participants who reported higher avoidance and higher anxiety with mother placed

their mother further from the core-self.

*Father*

Step 1 was not significant, but Step 2 was (see Table 63) as Table 3 shows below.

Participants who reported lower relationship satisfaction, less psychological presence, lower

perceived responsive care, and lower propensity to use father as an attachment figure placed their

father further from the core-self. For Step 3, attachment style with father significantly predicted

father's distance beyond individual and relationship characteristics. Participants with higher

avoidance, but not anxiety, with father placed their father further from the core-self.

*Partner*

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Step 1 was significant (Table 74) as Table 4 shows below.

<div align="center">INSERT TABLE 4 ABOUT HERE</div>

Men placed their partner closer to the core-self than did women. Step 2 was significant.

Participants with lower relationship satisfaction, lower perceived responsive care, and lower

propensity to use partner as an attachment figure scores placed their partner further from the

core-self. Interestingly, participants who reported higher negative affect scores placed their

partner *closer* to the core-self. At Step 3 attachment style with partner significantly predicted

partner's distance beyond individual and relationship characteristics. Participants with higher

avoidance, but not anxiety, with partner placed their partner further from the core-self.


**Attachment Style as a Predictor of Distance from the Core-Self over Time**

Table 8-5 displays the descriptive statistics and zero-order correlations of the Wave 1

relationship characteristics and distances from the core-self at Wave 2.

<div align="center">INSERT TABLE 5 ABOUT HERE</div>

In general, each figure was placed closer to the core-self over time. For mother and father, but

not romantic partner, relationship quality variables were meaningfully correlated with DCS at

Wave 2: Less satisfactory relationships and those marked by attachment insecurity at Wave 1

were placed further from the core-self over time. Only attachment avoidance with partner at

Wave 1 was significantly correlated with Wave 2 DCS for partner.

To test Hypotheses 1b and 2b, we conducted hierarchical regression analyses with Wave

2 DCS for mother, father, and partner as the criterion variables. At Step 1, we entered Wave 1

DCS. At Step 2, we entered the individual and relationship characteristics and relationship-

specific attachment style assessed at Wave 1.

### Mother

After controlling for Wave 1 distance ($\Delta R^2 = .238$, $F$ of change $(1,103) = 32.2$, p $< .001$ ), the Step 2 variables explained an additional 16.9%  of the variance in mother's Wave 2 distance ($\Delta R^2 = .169$, $F$ of change $(13,90) = 1.97$, $p = .032$). None of the Wave 1 individual (age, sex) and relationship characteristics were unique predictors of mother's distance over time ($ps > .128$). Attachment anxiety ($\beta = .244$, $t = 2.32$, $p = .022$), but not avoidance ($\beta = .135$, $t = 0.917$, $p = .362$) predicted positioning mother further from the core-self over time (Total $R^2 = .407$, Adj. $R^2 = .315$, $F$ of model $(14, 90) = 4.41$, $p < .001$).

### Father

After controlling for Wave 1 distance ($\Delta R^2 = .343$, $F$ of change $(1,87) = 45.5$, $p < .001$), additional variance in father's distance over time was explained by the Step 2 variables ($\Delta R^2 = .151$, $F$ of change $(11,76) = 1.97$, $p = .034$); however, none of the variables, including attachment style, were unique predictors ($ps > .158$; Total $R^2 = .494$, Adj. $R^2 = .414$, $F$ of model $(12,76) = 6.19$, $p < .001$).

### Partner

After controlling for Wave 1 distance ($\Delta R^2 = .083$, $F$ of change $(1,42) = 3.78$, $p = .059$), the Step 2 variables did not significantly explain additional variance in partner's distance at Wave 2 ($\Delta R^2 = .085$, $F$ of change$(7,35) = 0.507$, $p = .823$;  (Total $R^2 = .167$, Adj. $R^2 = .023$, $F$ of model $(8,35) = 0.878$, $p = .544$).

### Change in Network Membership over Time

In the following analyses, all participants had included the person on the HMT at Wave 1.  Change in network membership over time was based on whether a person was included on

the HMT at Wave 1 only (i.e., dropped from the network over time) or included at both waves.

The majority of mothers (77%), fathers (75%), and partners (60%) were included at both waves.

*Mother*

There were no significant differences in any Wave 1 variables between participants who

included mother at Wave 1 only (*n* = 32) and those who included mother at both waves (*n* = 106)

(*p*s > .052).

*Father*

Compared to participants who included father at Wave 1 only (*n* = 30), those that

included father at both waves (*n* = 89) reported lower avoidance ($M_{both}$ = 3.33, *SD* = 1.36 vs. *M*

~~W~~wave1, only = 4.06, *SD* = 1.61, *t* (117) = 2.39, *p* =.018), higher relationship satisfaction ($M_{both}$=

5.64, *SD* = 1.21 vs. ~~$M_{wave1}$~~$M_{Wave1, only}$ = 4.93, *SD* = 1.63, *t* (40) = -2.21, *p* = .033; Levene's *F* =

7.57, *p* = .007), and higher use of father as an attachment figure ($M_{both}$ = 2.63, *SD* = 0.82 vs.

~~$M_{wave1}$~~$M_{Wave1, only}$ = 2.13, *SD* = 1.22, *t* (38) = -2.07, *p* = .045; Levene's *F* = 13.9, *p* < .001) at

Wave 1.

*Partner*

Compared to participants that were currently single or in a new relationship at Wave 2 (*n*

= 27), those in the same relationship (*n* = 41) reported lower avoidance ($M_{same}$ = 1.74, *SD* =

0.734 vs. $M_{different}$ = 2.41, *SD* = 1.11, *t* (41) = 2.79, *p* = .008; Levene's *F* = 9.71, *p* = .003); lower

negative affect ($M_{same}$ = 1.26, *SD* = 0.791 vs. $M_{different}$ = 1.76, *SD* = 0.993, *t* (66) = 2.32, *p* =

.024); and higher relationship satisfaction ($M_{same}$ = 6.01, *SD* = 1.08 vs. $M_{different}$ = 5.32, *SD* =

1.50, *t* (43) = -2.05, *p* = .046; Levene's *F* = 6.64, *p* = .012) at Wave 1.

***Reasons for Parents' Inclusion in Attachment Networks over Time***

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Because few participants (1 for mother, 3 for father) who did not include the parent on the Wave 2 HMT completed the reasons for dropping a parent questions, we could only examine reasons for keeping parents in the attachment network. ~~Descriptive statistics and correlations are in Table 10~~.

On average, participants disagreed that they had kept mother and father in their attachment network because: despite the relationship being difficult, they hoped that they would repair the relationship $(M_{mother} = 1.76, SD = 1.53; M_{father} = 2.05, SD = 1.78)$ and hoped the parent might someday be there for them $(M_{mother} = 1.76, SD = 1.60; M_{father} = 1.86, SD = 1.60)$. In contrast, participants strongly agreed that they had kept their parent in their network because they were satisfied with their relationship $(M_{mother} = 6.43, SD = 1.14; M_{father} = 6.19, SD = 1.12)$ and because the parent was a significant part of their life $(M_{mother} = 6.94, SD = 0.23; M_{father} = 6.79, SD = 0.64)$.

Attachment anxiety at Wave 1 was positively correlated with "hope to repair" $(r_{mother} (105) = .372, p < .001; r_{father} (86) = .539, p < .001)$, "hope might be there for me" $(r_{mother} = .509, p < .001; r_{father} = .565, p < .001)$ and negatively correlated with "satisfied with our relationship" $(r_{mother} = -.513, p < .001; r_{father} = -.534, p < .001)$ and "significant part of my life" (for father only; $r_{mother} = -.170, p = .083; r_{father} = -.333, p = .002$). Attachment avoidance at Wave 1 was positively correlated with "hope to repair" (for father, only; $(r_{mother} = .122, p = .215; r_{father} = .292, p = .006)$, "hope might be there for me" (for father, only; $r_{mother} = .187, p = .056; r_{father} = .236, p = .036$) and negatively correlated with "satisfied with our relationship" $(r_{mother} = -.322, p < .001; r_{father} = -.435, p < .001)$ and "significant part of my life" $(r_{mother} = -.332, p < .001; r_{father} = -.321, p = .003)$.

**Qualitative Findings**

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Of the 12 themes, four were present in participants' descriptions of why they had or had not kept their mother or father in their network. Each theme, its operational definition, and some example extracts are shown in Table 6 below.

INSERT TABLE 6 ABOUT HERE

Three of these themes, perceived closeness, change in physical proximity or contact, and change in psychological availability or intimacy codes, were classified into a meta-theme, perceived closeness. The meta-theme reflected reasons for keeping or dropping parents and was present in 38% and 34% of responses for mother and father, respectively. Responses referred to the closeness in the parental relationship and how it had changed over time and to aspects of subjective (e.g., sharing confidences, intimacy) and objective closeness (e.g., changes in amount of contact). The fourth theme, caregiving/social support, reflected reasons for keeping the parent in the network and was present in 28% and 26% of responses for mother and father, respectively. Responses referred to using the parent(s) as a secure base or safe haven, to turning to their parents when experiencing positive and negative emotions, and to their parents "being there" and providing different forms of support (e.g., emotional, financial).

## Discussion

The present study investigated the dynamic nature of adults' attachment networks by examining the extent to which attachment style, relative to individual and other relationship characteristics, predicted distance from the core-self over time.

**Predictors of the Organization of the Attachment Network**

Consistent with the hypotheses relationship-specific attachment style shaped the organization of adults' attachment networks. At Wave 1, after accounting for individual and relationship characteristics, higher avoidance and anxiety with mother and higher avoidance with

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father and partner were associated with these network members being placed further from the

core-self. At Wave 2, higher anxiety with mother assessed at Wave 1 -was associated with

moving mother further from the core-self 12-months later. Attachment avoidance and anxiety

with father and avoidance with partner were only correlated with, but not predictors of, these

figures' Wave 2 distance. Attachment avoidance reflects a discomfort with closeness and

emotional dependence, which, as our findings show, is captured in symbolically distancing

network members from the core-self. In contrast attachment anxiety reflects a greater desire for

closeness and self-other merging (Mikulincer & Shaver, 2007), yet participants high in

attachment anxiety with mother demonstrated emotional distancing of the mother from the core-

self. Ainsworth (1989) proposed that where people have insecure attachment to parents they

might forge attachments with other more optimal caregivers. Friedlmeier and Granqvist (2006)

found that attachment anxiety and insecure maternal attachment history predicted a greater

tendency to use peers over parents. Consistent with Ainsworth's (1989) proposal, we speculate

that adults might have created psychological distance from a maternal relationship in which they

have not consistently found security and comfort as they pursue alternative attachment

relationships.

Attachment style with mother significantly predicted distance over time, whereas

attachment style with father and with partner did not. The differential association between

attachment style with mother and father and distance over time is consistent with the pattern of

findings reported by Friedlmeier and Granqvist (2006). In their sample of adolescents, insecure

attachment histories with mother, but not father, was associated with the transfer of attachment

functions over time. Together these findings point to the significance of the maternal attachment

bond. That attachment style with romantic partner did not predict distances over time, whereas

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attachment style with mother did, could be because attachment styles with parents are more

stable over time than those with romantic partners (Fraley, Vicary, Brumbaugh, & Roisman,

2011). According to the entrenchment hypothesis, young adults' working models of parents are

based on extensive experience whereas because romantic relationships are still developing the

partner attachment model is in a state of adjustment (Fraley et al., 2011). Although attachment

style with partner at Wave 1 predicted partner's distance when both were assessed concurrently,

it might not have accurately reflected the level of security 12-months later and, therefore, was

less likely to predict partner's distance at Wave 2.

Relationship characteristics also shaped the organization of the attachment network when

assessed concurrently. Consistent with extant research (Carnelley et al., 2008; Rowe &

Carnelley, 2005), less satisfactory attachment bonds, in terms of lower propensity to use for

attachment support and less perceived responsive care, were placed further from the core-self.

Of the frequency of contact variables, only those pertaining to mother were significant

predictors. More frequent self-initiated non-need contact with mother predicted placing mother

closer to the core-self. In contrast, and due to suppressor effects of self- and mother-initiated

need-based contact, more frequent mother-initiated non-need-based contact was associated with

placing mother further from the core-self. Mothers who excessively 'check-in' with their adult

child without a need-based reason might be perceived as intrusive and interfering with

autonomy, prompting emotional distancing. This might be particularly the case in a sample of

university students living away from home, developing adult relationships, and pursuing

academic or work-related goals. Partners with whom participants reported higher negative affect

were placed closer to the core-self, despite negative affect not being correlated with distances.

Given that this finding was not predicted and that negative affect was correlated meaningfully

with other relationship characteristics (e.g., relationship satisfaction), we do not discuss this

finding further.

Parents' psychological presence in adults' daily lives could reflect the symbolic nature of

parental attachment in adulthood (that we argue a diagrammatic tool like the HMT is better

suited to capture than other measures of adults' attachment hierarchies). Indeed, participants who

reported more psychological presence of their mother and father in their daily lives placed the

parent closer to the core-self. These participants also reported more frequent contact with

parents, suggesting that mental representations of these parents might be highly accessible due to

frequent activation during contact as well as reactivation of memories.

Of the individual characteristics, age (mother only) and gender (mother and partner), but

not relationship status, explained differences in network organization. Older (versus younger)

participants placed their mother further from the core-self, consistent with past research

(Markiewicz et al., 2006; Rosenthal & Kobak, 2010). Men placed their mothers further from, and

their partners closer to, the core-self than women did, but there were no gender differences in

distance of father. Rosenthal and Kobak (2010) found that mothers were ranked higher in

women's hierarchies than men's. Thus, at this stage of development men may seek mother less

than women for attachment support, which is reflected in the greater distance observed on the

HMT. Behaviors that are perceived to signal closeness (e.g., tangible support, emotional

disclosure) may differ between men and women (Feeney, 1999), which might explain the

observed gender difference in partner's distance from the core-self. Romantic relationship status

was not a predictor of distance of parents at Wave 1, which may reflect the normative process of

establishing autonomy from parents. Partnered participants placed their partner closer to the

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core-self than their parents. This finding is in line with extant findings that show adults rank

partners over parents as sources of attachment support (e.g., Trinke & Bartholomew, 1997).

Parents' marital status also shaped the organization of the attachment network. If parents

were separated, fathers were placed further from the core-self than if parents were married.

Following the separation, fathers were rarely the primary caregiver (3% compared to 71% of

mothers), which might explain the greater emotional distance. Separated parents were also

positioned further from each other on the HMT than married parents were. Consistent with Rowe

and Carnelley (2005) this finding demonstrates that the HMT is useful in demonstrating

meaningful associations between network members as well as between network members and the

core-self.

In sum, the present findings corroborate those of Rowe and Carnelley that secure

relationships are placed closer to the core-self and demonstrate that attachment style is an

important predictor of the organization of adults' attachment networks over time. That individual

and relationship factors also predicted distance of network members advances current

understanding of what shapes the organization of adults' attachment networks, beyond

attachment style, age, and romantic relationship status. Network members who were perceived to

be less optimal attachment figures were less likely to be central within the network. The over

time analyses provide some support to our claim that attachment styles predict attachment

network fluidity, as captured by the HMT: None of the individual and relationship characteristics

predicted distance over time but, attachment style with mother did. Future research could

address whether attachment style plays a causal role in shaping change in the organization of

attachment networks over time.

**Network Membership over Time**

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Our findings were largely consistent with Ainsworth's (1989) premise that parental

attachment bonds continue into adulthood: The majority of participants kept their mother and

father in their attachment networks across both waves. Individual differences in attachment style

were linked to reasons for maintaining parental attachments: Participants who reported less

insecurity (i.e., lower anxiety and avoidance) in their parental attachments were more likely to

endorse keeping their parents in the network because of their parents' significance in their life,

relationship satisfaction and less likely because the relationships were difficult.

Father and partner, but not mother, relationships marked by high attachment avoidance

were less likely to be included on the HMT over time, which is consistent with research linking

attachment style to relationship termination (e.g., Gillath et al., 2012). Relative to partners and

mothers, fathers are used less as, and are less preferred, attachment figures (e.g., Rosenthal &

Kobak, 2010; Trinke & Bartholomew, 1997). Contributing to current understanding, our findings

showed that fathers, but not partners or mothers, who were sought for fewer attachment functions

were also more likely to be removed from the attachment network over time.

Father and partner, but not mother, relationships marked by lower relationship

satisfaction at Wave 1 were more likely to be jettisoned from the network over time. These

findings are in line with the investment model's components (Rusbult, 1980). In this model,

satisfaction is a predictor of commitment and commitment, in turn, is linked to relationship

maintenance and persistence. Participants were also more likely to exclude partners with whom

they experienced more frequent anger, resentment, and conflict from their networks over time.

Nevertheless, whereas it might be easier to terminate a romantic relationship (e.g., if there are no

investments that require continued interaction), given the intricate ties some adults have with

their father (as part of the family system), it is likely more difficult to terminate a parental

attachment. Ending a relationship with a parent might be more likely – or easier to manage - if parents are divorced or geographically separated from the adult child. In support of this idea, participants with divorced parents showed greater emotional distance from their fathers. We did not find any differences in the relationship characteristics for mothers kept and dropped from the network over time; this could be due to the psychological importance of the mother-child relationship. Although we included a range of relationship characteristics, our list was not exhaustive. The experiences required to significantly disrupt this bond might be difficult to capture using quantitative measures.

The quantitative analyses showed that parents were significant figures in the participants' lives and that participants were largely satisfied with these relationships. Indeed, participants' own explanations for including (or excluding) their parents from their networks highlighted the importance of continuing to use parents as attachment figures. The qualitative findings captured the adults' use of their parents as providers of proximity, a secure base, and a safe haven. Although participants might not have actively included parents on their lists of significant others at Wave 2, it was apparent from the qualitative analyses that parents remained important figures in the lives of these adults.

**Study Evaluation and Future Research**

The present study is one of a few to employ a longitudinal design to address important questions about change in attachment networks. Our findings confirm the predictive, discriminant, and convergent validity of the HMT as a measure of attachment networks. Despite these strengths, the study has limitations. To prevent participant fatigue we used a number of one- and two-item measures to assess relationship characteristics. Because the reliability of the negative affect measure was low ($\leq .700$) and internal consistency was not estimated for the

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single-item measures, we advise caution in drawing conclusions based on these measures. For

the father and partner distance over time analyses, because the ratio of predictors-to-cases was

low, we may not have had enough statistical power to adequately test the over time hypothesis

for these figures. The attrition rate was high at ~60%, but was partly due to approximately 30%

of participants graduating between waves. There were no systematic relationship differences

between those participants that did or did not return, but returning participants were younger on

average. Participants were university students and the majority were young adults (i.e., 18-20

years). Although this may be an important time for examining the reorganization of attachment

networks (Pitman & Scharfe, 2010), future research should examine factors that predict

reorganization over time at other developmental transitions. For example, over time, parent-adult

child attachments may become more symmetrical (Ainsworth, 1985) or adult children might

become caregivers for their own parents (e.g., Carpenter, 2001; Circirelli, 1993). Several of the

themes identified in the open-ended responses were not present in participants' reasons for

keeping or dropping their parents from their networks. This could be because the coding scheme

largely reflected themes of romantic/marital dissolution. Finally, we advise caution in

interpreting these analyses because although some participants did not include their parents on

the list at Wave 2, their responses suggested they still considered the parent to be a member of

their attachment network.

It is noteworthy that whereas attachment style to father did not predict father's

distance from the core-self over time it was implicated in father's inclusion in the

attachment network over time. Moreover, in line with research that shows the position of

fathers in attachment networks is lower than mother's (Freeman & Almond, 2010;

Rosenthal & Kobak, 2010), our findings suggest the relationship characteristics associated

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with mother and father's placement in the network also differ. Indeed, the pattern of

findings for father showed several similarities with those found for partner (i.e., predictors

of distance over time; roles of attachment avoidance and relationship satisfaction in

inclusion in the attachment network over time). Together, these findings suggest that

attachment to fathers in adulthood has some qualitative differences to attachment to

mothers. For example, young women viewed their fathers primarily as sources of

instrumental, rather than emotional, support (Freeman & Brown, 2010). Differences in

attachments to mother and father appear to emerge in adolescence (Kobak, Rosenthal, &

Serwik, 2005; Kobak, Rosenthal, Zajac, & Madsen, 2007). What we have observed might

be a consequence of cohort effects in which mothers were the primary caregivers, and in

cases of divorce, children were placed with mothers over fathers. Future research might

explore whether fathers who are the primary source of comfort and security are also

demoted in the hierarchy. Future research might also explore the transition of a parent as

an attachment figure to no longer serving as one for the adult child (e.g., whether there is

role reversal whereby the adult child becomes the caregiver; whether the affectional bond

transitions from attachment to affiliative).

In conclusion, the present study found attachment style explains placement of parents and

meaningful movement in mothers' placement in adults' attachment networks over time – both in

terms of organization and content – as well as and beyond, age, romantic relationship status and

relationship quality. Further our findings confirm the use of the HMT to capture attachment

network fluidity. Together, these findings further our understanding of the fluid nature of adults'

attachment networks over time and highlight areas for future research to better understand

change in parental attachments across the lifespan.

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**Authors' Note**

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## References

Ainsworth, M. D. (1989). Attachments beyond infancy. *American Psychologist, 44,* 709-716.

Ainsworth, M. D. (1985). Attachments across the life span. *Bulletin of the New York Academy of medicine, 61*, 792-812.

Antonucci, T. C. (1986). Hierarchical mapping technique. *Generations, 10,* 10-12.

Antonucci, T. C., Akiyama, H., & Takahashi, K. (2004). Attachment and close relationships across the life span. *Attachment and Human Development, 6,* 353-370. DOI: 10.1080/1461673042000303136

Aron, A., Aron, E. N., & Smollan, D. (1992). Inclusion of Other in the Self scale and the structure of interpersonal closeness.

Bowlby, J. (1969/1982). *Attachment and loss, volume 1: Attachment*. New York: Basic Books.

Bowlby, J. (1973/1998). *Attachment and loss, vol. 2: Separation: Anxiety and anger*. New York: Basic Books.

Brennan, K. A., Clark, C. L., & Shaver, P. R. (1998). Self-report measurement of adult attachment: An integrative overview. In J. A. Simpson & W. S. Rholes (Eds.), *Attachment and close relationships* (pp. 46-76). New York: Guilford Press.

Carnelley, K. B., Julal, F. S., Hepper, E. G., & Rowe, A. C. (2008, July). *Hierarchical mapping technique:  A research tool*. Paper presented at the International Association for Relationship Research Conference, Providence, Rhode Island.

Carpenter, B. D. (2001). Attachment bonds between adult daughters and their older mothers associations with contemporary caregiving. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences, 56*, 257-266.

Cicirelli, V. G. (1993). Attachment and obligation as daughters' motives for caregiving behavior
and subsequent effect on subjective burden. *Psychology and Aging, 8*, 144-155.

Cicirelli, V. G. (2010). Attachment relationships in old age. *Journal of Social and Personal
Relationships, 27,* 191-199. DOI:10.1177/0265407509360984

~~Cicirelli, V. G. (1993). Attachment and obligation as daughters' motives for caregiving behavior
and subsequent effect on subjective burden. *Psychology and Aging, 8*, 144-155.~~

Cole, J. C., Rabin, A. S., Smith, T. L., & Kaufman, A. S. (2004). Development and validation of
a Rasch-derived CES-D short form. *Psychological Assessment*, *16*, 360-372.

Collins, N.L., Guichard, A.C., Ford, M.B., & Feeney, B.C. (2004). Working models of
attachment: New developments and emerging themes. In W.S. Rholes & J.A. Simpson
(Eds.), *Adult attachment: Theory, research, and clinical implications* (pp. 196–239). New
York: Guilford Press.

Collins, N. L., & Read, S. J. (1994). Cognitive representations of attachment: The structure and
function of working models. In K. Bartholomew, & D. Perlman (Eds.), *Advances in
personal relationships, volume 5* (pp. 53–90). London: Jessica Kingsley.

Collins, W. A., & Steinberg, L. (2006). Adolescent development in interpersonal context. In W.
Damon, & R. M. Lerner (Eds.), *Handbook of child psychology: Volume 3 – Social,
Emotional, and Personality Development* (pp. 551-590). Wiley.

Doherty, N. A., & Feeney, J. A. (2004). The composition of attachment networks throughout the
adult years. *Personal Relationships, 11,* 469-488.

Feeney, J. A. (1999). Issues of distance and closeness in dating relationships: Effects of sex and
attachment style. *Journal of Social and Personal Relationships, 16,* 571-590. DOI:
10.1177/0265407599165002

Feeney, J. A. (2004). Transfer of attachment from parents to romantic partners: Effects of

individual and relationship variables. *Journal of Family Studies, 10,* 220-238.

Feeney, J. A. (1999). Issues of distance and closeness in dating relationships: Effects of sex and

attachment style. *Journal of Social and Personal Relationships, 16,* 571-590. DOI:

10.1177/0265407599165002

Finley, G. E., Mira, S. D., & Schwartz, S. J. (2008). Perceived paternal and maternal

involvement: Factor structures, mean differences, and parental roles. *Fathering, 6,* 62-82.

DOI: 10.3149/fth.0601.62

Finley, G. E., & Schwartz, S. J. (2004). The father involvement and nurturant fathering scales:

Retrospective measures for adolescent and adult children. *Educational and Psychological*

*Measurement, 64,* 143-164.

Fletcher, G. J. O., Simpson, J. A., & Thomas, G. (2000). The measurement of perceived

relationship quality components: A confirmatory factor analytic approach. *Personality*

*and Social Psychology Bulletin, 26,* 340-354.

Fraley, R. C., & Davis, K. E. (1997). Attachment formation and transfer in young adults' close

friendships and romantic relationships *Personal Relationships, 4,* 131-144.

Fraley, R. C., Heffernan, M. E., Vicary, A. M., & Brumbaugh, C. C. (2011). The experiences in

close relationships—Relationship Structures Questionnaire: A method for assessing

attachment orientations across relationships. *Psychological Assessment*, *23*, 615-625.

Fraley, R. C., Vicary, A. M., Brumbaugh, C. C., & Roisman, G. I. (2011). Patterns of stability in

adult attachment: an empirical test of two models of continuity and change. *Journal of*

*Personality and Social Psychology, 101,* 974-992. DOI: 10.1037/a0024150

Freeman, H., & Almond, T. M. (2010). Mapping young adults' use of fathers for attachment

support: Implications on romantic relationship experiences. *Early Child Development and*

*Care, 180,* 227-248. DOI: 10.1080/03004430903415080

Freeman, H., & Brown, B. B. (2001). Primary attachment to parents and peers during

adolescence: Differences by attachment style. *Journal of Youth and Adolescence, 30,*

653-674.

Friedlmeier, W., & Granqvist, P. (2006). Attachment transfer among Swedish and German

adolescents: A prospective longitudinal study. *Personal Relationships, 13,* 261-279.

Gillath, O., Johnson, D. K., Selcuk, E., & Teel, C. (2011). Comparing old and young adults as

they cope with life transitions: The links between social network management skills and

attachment style to depression. *Clinical Gerontologist*, *34*, 251-265.

Gosling, S. D., Rentfrow, P. J., & Swann, W. B. (2003). A very brief measure of the Big-Five

personality domains. *Journal of Research in Personality*, *37*, 504-528.

Heffernan, M. E., Fraley, R. C., Vicary, A. M., & Brumbaugh, C. C. (2012). Attachment features

and functions in adult romantic relationships. *Journal of Social and Personal*

*Relationships, 29,* 671-693. DOI: 10.1177/0265407512443435

Hsieh, H. F., & Shannon, S. E. (2005). Three approaches to qualitative content analysis.

*Qualitative Health Research*, *15*, 1277-1288.

Kobak, R., Rosenthal, N., & Serwik, A. (2005). The attachment hierarchy in middle childhood.

In K. A. Kerns, & R. A. Richardson (Eds.), *Attachment in middle childhood* (pp. 71-88).

New York, NY: Guilford Press.

36

Kobak, R., Rosenthal, N. L., Zajac, K., & Madsen, S. D. (2007). Adolescent attachment

hierarchies and the search for an adult pair-bond. *New Directions for Child and*

*Adolescent Development, 117,* 57-72. DOI: 10.1002/cd.194

Kunce, L. J., & Shaver, P. R. (1994). An attachment-theoretical approach to caregiving in

romantic relationships. In K. Bartholomew, & D. Perlman (Eds.), *Advances in personal*

*relationships: Vol. 5 Attachment processes in adulthood* (pp. 205-237). London: Jessica

Kingsley.

Markiewicz, D., Lawford, H., Doyle, A. B., & Haggart, N. (2006). Developmental differences in

adolescents' and young adults' use of mothers, fathers, best friends, and romantic

partners to fulfill attachment needs. *Journal of Youth and Adolescence, 35,* 127-140.

DOI:10.1007/s10964-005-9014-5

Mayseless, O. (2004). Home leaving to military service: Attachment concerns, transfer of

attachment functions from parents to peers, and adjustment. *Journal of Adolescent*

*Research,* 19, 533-558.

Mikulincer, M., & Shaver, P. R. (2007). *Attachment in adulthood: Structure, dynamics, and*

*change*. Guilford Press.

Milyavskaya, M., & Lydon, J. E. (2013). Strong but insecure: Examining the prevalence and

correlates of insecure attachment bonds with attachment figures. *Journal of Social and*

*Personal Relationships, 30,* 529-544.

Moos, R. H., & Moos, B. S. (1986). *Family Environment Scale* (2nd ed.). Palo Alto, CA:

Consulting Psychologists Press.

Perl, H. I., & Trickett, E. J. (1988). Social network formation of college freshmen: Personal and

environmental determinants. *American Journal of Community Psychology*, *16*, 207-224.

Peterson, J. L., & Zill, N. (1986). Marital disruption, parent-child relationships, and behavior

problems in children. *Journal of Marriage and the Family*, *48,* 295-307.

Pitman, R., & Scharfe, E. (2010). Testing the function of attachment hierarchies during emerging

adulthood. *Personal Relationships*, *17*, 201-216.

Potter, W. J., & Levine-Donnerstein, D. (1999). Rethinking validity and reliability in content

analysis. *Journal of Applied Communication Research, 27*, 258-284.

Rosenthal, N. L., & Kobak, R. (2010). Assessing adolescents' attachment hierarchies:

Differences across developmental periods and associations with individual adaptation.

*Journal of Research on Adolescence, 20,* 678-706. DOI: 10.1111/j.1532-

7795.2010.00655.x

Rowe, A. C., & Carnelley, K. B. (2005). Preliminary support for the use of a hierarchical

mapping technique to examine attachment networks. *Personal Relationships, 12,* 499-

519.

Rusbult, C. E. (1980). Commitment and satisfaction in romantic associations: A test of the

investment model. *Journal of Experimental Social Psychology*, *16*, 172-186.

Rusbult, C. E., Martz, J. M., & Agnew, C. R. (1998). The investment model scale: Measuring

commitment level, satisfaction level, quality of alternatives, and investment size.

*Personal Relationships*, *5*, 357-387.

Seibert, A. C., & Kerns, K. A. (2009). Attachment figures in middle childhood. *International

Journal of Behavioral Development, 33*, 1-9.

Sorokou, C. F., & Weissbrod, C. S. (2005). Men and women's attachment and contact patterns

with parents during the first year of college. *Journal of Youth and Adolescence*, *34*, 221-

228.

38

Spielberger, C. D., Gorsuch, R. L., Lushene, R., Vagg, P. R., & Jacobs, G. A. (1983). *Manual for the State-Trait Anxiety Inventory*. Palo Alto, CA: Consulting Psychologists Press.

Tabachnick, B. G. & Fidell, L. S. (2013). *Using multivariate statistics*, 6th ed. Needham Heights, MA: Allyn and Bacon.

Trinke, S. J., & Bartholomew, K. (1997). Hierarchies of attachment relationships in young adulthood. *Journal of Social and Personal Relationships, 14,* 603-625.

Wei, M., Russell, D. W., Mallinckrodt, B., & Vogel, D. L. (2007). The Experiences in Close Relationship Scale (ECR)-short form: Reliability, validity, and factor structure. *Journal of Personality Assessment, 88,* 187-204.

Zeifman, D., & Hazan, C. (2010). Pair bonds as attachments: Reevaluating the evidence. In J. Cassidy & P. R. Shaver (Eds.), *Handbook of attachment: Theory, research and clinical applications,* (2nd ed., pp. 436-455). New York, NY: Guilford Press.

**Footnotes**

[1] The additional relationship characteristics were derived from the extant literature and

through extensive discussion with members of the United Kingdom Attachment Network, a

group of internationally-recognized experts in adult attachment theory, which took place in

2011-2012.

~~[2] In addition, we used a directed approach to content analysis (Hsieh & Shannon, 2005)~~

~~to explore reasons for keeping and dropping parents from their attachment networks over time.~~

~~In the interest of space, we have put this data and analysis in the supplemental materials.~~

[3][2] We included additional measures to address other hypotheses about change in

attachment networks over time: At Wave 1, the CES-D short form  (Cole,  Rabin, Smith, &

Kaufman, 2004), State-Trait Anxiety Inventory (Spielberger, Gorsuch, Lushene, Vagg, &

Jacobs, 1983), Ten Item Personality Inventory (Gosling, Rentfrow, & Swann, 2003) and a

measure of significant others' psychological well-being, and at Wave 2, the ECR-short form

(Wei, Russell, Mallinckrodt, & Vogel, 2007), psychological well-being measures, the ANQ

(Trinke & Bartholomew, 1997), and the Wave 1 relationship characteristics measures for any

new people on the Wave 2 list.

[4][3]Outliers were winsorised (Tabachnick & Fidell, 2013) and missing values replaced

with the mean. There was less than 5% missing for all variables except frequency of conflict

with mother (8.25%) and father (8.12%). Missing conflict with mother scores were predicted

from participants' age (Little's MCAR, $\chi^2$ (107) = 38, $p$ = .024). Participants that completed the

measure were older ($M$ = 20.1) than those who did not ($M$ = 19.1 years), $t$(51) = 4.2, $p$ < .001.

Missing conflict with father scores were missing at random (Little's MCAR, $\chi$2 (122) = 110, $p$ =

40

.77). Participants that completed the measure were older (M = 20.2) than those who did not (M = 19.0), *t*(45) = 4.40, *p* < .001.

⁵⁴Findings were the same when based on non-mean replaced data, with the following exceptions. For mother's distance (*n* = 308) at Step 1 gender was not a significant predictor (*β* = .102, *p* = .073), but context was (*β* = .124, *p* = .032); at Step 2, relationship satisfaction was not significant (*β* = -.118, *p* = .065); and, at Step 3, attachment anxiety was not significant (*β* = .073, *p* = .142). For father's distance (*n* = 261), father-initiated non-need-based contact was a significant predictor (*β* = .15, *p* = .046) at Step 2. For partner's distance (*n*=189), the results were the same as those for the mean-replaced data.

⁶⁵Mother's distance differed by university, *F*(2,345) = 4.06, *p* = .018. Participants from University A placed mother closer (*M* = 23.7) to the core-self than did those from University B (*M* = 29.8), *p* = .08 and University C (*M* = 28.1), *p* = .06.

Table 1

*Descriptive Statistics and Zero-order Correlations with Distance from Core-Self at Wave 1*

| Variable | Mean | *SD* | *r* | Alpha |
|---|---|---|---|---|
| *Mother Analyses (n=348)* | | | | |
| DCS Mother at Wave 1 (in mm) | 26.0 | 16.1 | -- | -- |
| Age | 20.8 | 5.10 | .15** | -- |
| Use as an attachment figure | 2.71 | 0.72 | -.40*** | -- |
| Psychological presence | 2.71 | 0.83 | .45*** | -- |
| Self-initiated need-based contact | 4.18 | 0.79 | -.38*** | .844 |
| Self-initiated nonneed-based contact | 4.00 | 1.01 | -.48*** | -- |
| Mother-initiated need-based contact | 4.38 | 0.69 | -.40*** | .788 |
| Mother-initiated nonneed-based contact | 4.15 | 0.97 | -.25*** | -- |
| Negative affect | 1.35 | 0.84 | .23*** | .648 |
| Relationship satisfaction | 5.97 | 1.15 | -.49*** | .955 |
| Perceived responsive care | 4.84 | 0.90 | -.44*** | .890 |
| Attachment anxiety with mother at Wave 1 | 1.36 | 0.81 | .36*** | .830 |
| Attachment avoidance with mother at Wave 1 | 2.52 | 1.34 | .64*** | .893 |
| Romantic relationship status | -- | -- | .04 | -- |
| *Father Analyses (n=299)* | | | | |
| DCS Father at Wave 1 (in mm) | 35.1 | 19.3 | -- | -- |
| Age | 20.5 | 4.21 | .08 | -- |
| Use as an attachment figure | 2.38 | 0.99 | -.40*** | -- |
| Psychological presence | 3.05 | 0.86 | .41*** | -- |
| Self-initiated need-based contact | 3.73 | 1.05 | -.46*** | .903 |
| Self-initiated nonneed-based contact | 3.08 | 1.10 | -.44*** | -- |
| Father-initiated need-based contact | 3.64 | 0.98 | -.42*** | .831 |
| Father-initiated nonneed-based contact | 3.15 | 1.13 | -.27*** | -- |
| Negative affect | 1.25 | 0.94 | .36*** | .700 |
| Relationship satisfaction | 5.47 | 1.45 | -.57*** | .967 |
| Perceived responsive care | 4.29 | 0.96 | -.51*** | . 886 |
| Attachment anxiety with father at Wave 1 | 1.51 | 1.04 | .36*** | .878 |
| Attachment avoidance with father at Wave 1 | 3.42 | 1.48 | .62*** | .906 |
| Romantic relationship status | | | .06 | |
| *Partner Analyses (n=205)* | | | | |
| DCS Partner at Wave 1 (in mm) | 20.0 | 12.4 | -- | -- |
| Age | 22.1 | 7.40 | -.07 | -- |
| Use as an attachment figure | 2.85 | 0.48 | -.35*** | -- |
| Negative affect | 1.31 | 0.85 | .05 | .690 |
| Relationship satisfaction | 5.91 | 1.17 | -.37*** | .949 |
| Perceived responsive care | 5.05 | 0.79 | -.27*** | .852 |
| Attachment anxiety with partner at Wave 1 | 2.31 | 1.43 | .20** | .909 |
| Attachment avoidance with partner at Wave 1 | 1.98 | 0.96 | .54*** | .824 |

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Note: DCS = distance from the core-self. Romantic relationship status: Mother analyses - 43% ($n$ = 151) not currently in a relationship; 57% ($n$ = 197) currently in a relationship; Father analyses - Romantic relationship status: 45% ($n$ = 134) not currently in a relationship; 55% ($n$ = 165) currently in a relationship

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

Table 2

*Predictors of Distance of Mother from the Core-Self*

| Predictor | $\Delta R^2$ | $B$ | SE $B$ | $B$ | $t$ |
|---|---|---|---|---|---|
| Step 1 | .045** | | | | |
| Age | | .393 | 1.72 | .125 | 2.29* |
| Sex | | 4.27 | 2.08 | .110 | 2.05* |
| Context | | 1.46 | 0.942 | .085 | 1.55 |
| Romantic relationship status | | .791 | 1.73 | .024 | 0.457 |
| Step 2 | .378*** | | | | |
| Use as an attachment figure | | -4.00 | 1.06 | -.180 | -3.79*** |
| Psychological presence | | 3.49 | 1.00 | .181 | 3.49*** |
| Self-initiated need based contact | | .379 | 1.17 | .019 | 0.324 |
| Self-initiated nonneed-based contact | | -3.89 | .979 | -.250 | -3.97*** |
| Mother-initiated need based contact | | -2.59 | 1.35 | -.111 | -1.92 |
| Mother-initiated nonneed-based contact | | 2.10 | .944 | .127 | 2.22* |
| Negative affect | | -1.45 | .995 | -.076 | -1.46 |
| Relationship satisfaction | | -2.47 | .868 | -.177 | -2.85** |
| Perceived responsive care | | -2.77 | 1.07 | -.156 | -2.59** |
| Step 3 | .067*** | | | | |
| Attachment anxiety with mother | | 2.16 | .966 | .109 | 2.24* |
| Attachment avoidance with mother | | 4.75 | .781 | .397 | 6.08*** |

Total $R^2$ = .491 (Adj. $R^2$ = .468), *F* of model (15, 332) = 21.3***

Step 1 *F* of change (3, 343) = 4.08, *p* = .003

Step 2 *F* of change (9, 334) = 24.4, *p* < .001

Step 3 *F* of change (2, 332) = 21.7, *p* < .001

* *p* < .05. ** *p* < .01. *** *p* < .001.

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Table 3

*Predictors of Distance of Father from the Core-Self*

| Predictor | $\Delta R^2$ | $B$ | SE $B$ | $\beta$ | $t$ |
|---|---|---|---|---|---|
| Step 1 | .019 | | | | |
| Age | | .337 | .267 | .074 | 1.26 |
| Sex | | -4.69 | 2.65 | -.102 | -1.77 |
| Romantic relationship status | | 1.77 | 2.26 | .046 | 0.784 |
| Step 2 | .432*** | | | | |
| Use as an attachment figure | | -2.45 | 1.02 | -.125 | -2.41* |
| Psychological presence | | 4.15 | 1.25 | .185 | 3.33*** |
| Self-initiated need based contact | | -.930 | 1.16 | -.051 | -0.804 |
| Self-initiated non-need-based contact | | -2.07 | 1.37 | -.118 | -1.52 |
| Father-initiated need based contact | | -.523 | 1.33 | -.027 | -0.393 |
| Father-initiated non-need-based contact | | 2.32 | 1.20 | .136 | 1.93 |
| Negative affect | | 1.31 | 1.12 | .064 | 1.17 |
| Relationship satisfaction | | -3.65 | .879 | -.274 | -4.15*** |
| Perceived responsive care | | -3.32 | 1.29 | -.166 | -2.58** |
| Step 3 | .022** | | | | |
| Attachment anxiety with father | | .304 | .996 | .016 | 0.305 |
| Attachment avoidance with father | | 3.40 | 1.01 | .261 | 3.38*** |

Total $R^2$ = .473 (Adj. $R^2$ = .447), *F* of model (14, 284) = 18.2***

Step 1 *F* of change (3, 295) = 1.87, *p* = .134

Step 2 *F* of change (9, 286) = 25.0, *p* < .001

Step 3 *F* of change (2, 284) = 5.95, *p* = .003

* *p* < .05. ** *p* < .01. *** *p* < .001.

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Table 4

*Predictors of Distance from the Core-Self of Partner*

| Predictor | $\Delta R^2$ | $B$ | SE $B$ | $\beta$ | $t$ |
|---|---|---|---|---|---|
| Step 1 | .042* | | | | |
| Age | | -.097 | .123 | -.055 | -0.80 |
| Sex | | -6.08 | 2.19 | -.192 | -2.78** |
| Step 2 | .253*** | | | | |
| Use as an attachment figure | | -7.96 | 1.65 | -.293 | -4.83*** |
| Negative affect | | -3.30 | 1.14 | -.213 | -2.90** |
| Relationship satisfaction | | -3.25 | .816 | -.289 | -3.99*** |
| Perceived responsive care | | -3.78 | 1.32 | -.227 | 2.87* |
| Step 3 | .096*** | | | | |
| Attachment anxiety with partner | | -.757 | .592 | -.082 | -1.28 |
| Attachment avoidance with partner | | 5.99 | 1.08 | .437 | 5.56*** |

Total $R^2$ = .391 (Adj. $R^2$ = .366), *F* of model (8, 196) = 15.7***

Step 1 *F* of change (2, 202) = 4.43, *p* = .013

Step 2 *F* of change (4, 198) = 17.8, *p* < .001

Step 3 *F* of change (2, 196) = 15.4, *p* < .001

* *p* < .05. ** *p* < .01. *** *p* < .001.

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Table 5

*Descriptive Statistics and Zero-order Correlations with Distance from Core-Self at Wave 2*

| Variable | Mean | SD | r |
|---|---|---|---|
| *Mother Analyses (n=105)* | | | |
| DCS Mother at Wave 2 (in mm) | 20.9 | 12.2 | |
| DCS Mother at Wave 1 (in mm) | 24.9 | 14.4 | .491*** |
| Use as an attachment figure | 2.78 | 0.65 | -.293** |
| Psychological presence | 2.70 | 0.80 | .355*** |
| Self-initiated need-based contact | 4.17 | 0.73 | -.428*** |
| Self-initiated nonneed-based contact | 3.97 | 0.94 | -.315*** |
| Mother-initiated need-based contact | 4.47 | 0.61 | -.384*** |
| Mother-initiated nonneed-based contact | 4.17 | 0.90 | -.261** |
| Negative affect | 1.31 | 0.72 | .277** |
| Relationship satisfaction | 6.09 | 0.99 | -.433*** |
| Perceived responsive care | 4.98 | 0.78 | -.377*** |
| Attachment anxiety with mother at Wave 1 | 1.35 | 0.78 | .410*** |
| Attachment avoidance with mother at Wave 1 | 2.33 | 1.17 | .487*** |
| *Father Analyses (n=89)* | | | |
| DCS Father at Wave 2 (in mm) | 26.6 | 13.0 | |
| DCS Father at Wave 1 (in mm) | 32.0 | 17.5 | .586*** |
| Use as an attachment figure | 2.63 | 0.82 | -.422*** |
| Psychological presence | 3.11 | 0.86 | .465*** |
| Self-initiated need-based contact | 3.76 | 0.93 | -.375*** |
| Self-initiated nonneed-based contact | 3.20 | 0.99 | -.456*** |
| Father-initiated need-based contact | 3.72 | 0.91 | -.406*** |
| Father-initiated nonneed-based contact | 3.11 | 1.10 | -.351*** |
| Negative affect | 1.20 | 0.86 | .191 |
| Relationship satisfaction | 5.64 | 1.21 | -.508*** |
| Perceived responsive care | 4.39 | 0.91 | -.407*** |
| Attachment anxiety with father at Wave 1 | 1.40 | 0.95 | .261* |
| Attachment avoidance with father at Wave 1 | 3.33 | 1.36 | .555*** |
| *Partner Analyses (n=44)* | | | |
| DCS Partner at Wave 2 (in mm) | 16.1 | 12.4 | |
| DCS Partner at Wave 1 (in mm) | 21.1 | 12.2 | .287 |
| Use as an attachment figure | 2.98 | 0.15 | -.080 |
| Negative affect | 1.39 | 0.86 | .106 |
| Relationship satisfaction | 5.89 | 1.13 | -.268 |
| Perceived responsive care | 5.08 | 0.69 | -.185 |
| Attachment anxiety with partner at Wave 1 | 2.08 | 1.12 | -.037 |
| Attachment avoidance with partner at Wave 1 | 1.89 | 0.87 | .332* |

Note: DCS = distance from the core-self on the bull's-eye diagram.

* *p* < .05. ** *p* < .01.*** *p* < .001.

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Table 6

*Themes and Operational Definitions for the Content Analysis*

| Meta-theme | Theme | Definition | Example extracts |
|---|---|---|---|
| Perceived closeness | Perceived closeness | Refers to the closeness in the relationship with the SO. | A: She's my mum, so I will always be close to her no matter how far away we are. [kept in Wave 2] |
| | Change in physical proximity / contact | Refers to a change in the amount or nature of physical (e.g., face-to-face) or verbal (e.g., telephone calls, Skype) contact with the SO. Reference may be made to seeing each other less, spending less time together, no longing sharing accommodation, moving to or being in different countries; a change in situation. Situational changes may involve the participant or SO starting work, changing universities, etc.. Proximity may be achieved physically or via modern forms of communication (e.g., Skype, email, etc.). | B: He is my dad and I feel much closer to him after his divorce. [kept in Wave 2]

C: I have always been close to my dad and still continue remaining close to him [kept in Wave 2]

D: Because she is my mother and is always there for me, also I feel closer to her more now than I did when I was a teenager. [kept in Wave 2] |
| | Change in psychological availability / intimacy | Refers to a change in the amount or nature of closeness in the relationship. Reference may be made to feeling less close to the SO, the participant or SO no longer sharing confidences (self-disclosure), or drifting apart, no longer being emotionally close. | E: I don't know why I included her last time, but I don't feel we've ever had a close relationship. I just don't get on with her [Wave 1, only]

F: Being down in [City] I rarely keep in contact with him and don't feel I have a particularly close relationship with him. Just steadily grew apart, but obviously still have a relationship. [Wave 1, only]

G: Just forgot really. Dad works away a lot so I always see more of mum than of him. Other than me being in uni and him working away it hasn't changed. He's still my dad and we're still close. [Wave 1, only] |

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| Meta-theme | Theme | Definition | Example extracts |
|---|---|---|---|
| Caregiving | | Refers to seeking emotional or tangible support from the SO; to depending on the SO. Uses SO for secure base (e.g., SO supports exploration) or safe haven (i.e. SO protects, comforts) functions. Sense of positive affect, enjoyment or encouragement from SO. | H: I rely on this person for financial help. I visit my dad at least 4 times a month and therefore he still is influential in my life [kept in Wave 2]<br><br>I: I am not as close to my dad but I can depend on him in times of need. [kept in Wave 2]<br><br>J: I am my dad's little girl. Our relationship is even stronger now, I talk with him about everything – life, boys, emotions, work, friends, parties. I even talk with him at 3am after I have been out and for some reason I'm upset. He calms me down and he shows me and gives me great amount of love. [kept in Wave 2]<br><br>K: They [mother] are very important to me. I would always go to this person in time of need. They understand me and love me unconditionally, I am there for them and they are there for me. I can always be myself around this person. [kept in Wave 2]<br><br>L: She is still as important to me as ever and is very supportive whenever I need supporting. She does a lot for me, and I can tell her when I am feeling down and she will help me work out my problem. [kept in Wave 2] |

Note: SO = significant other

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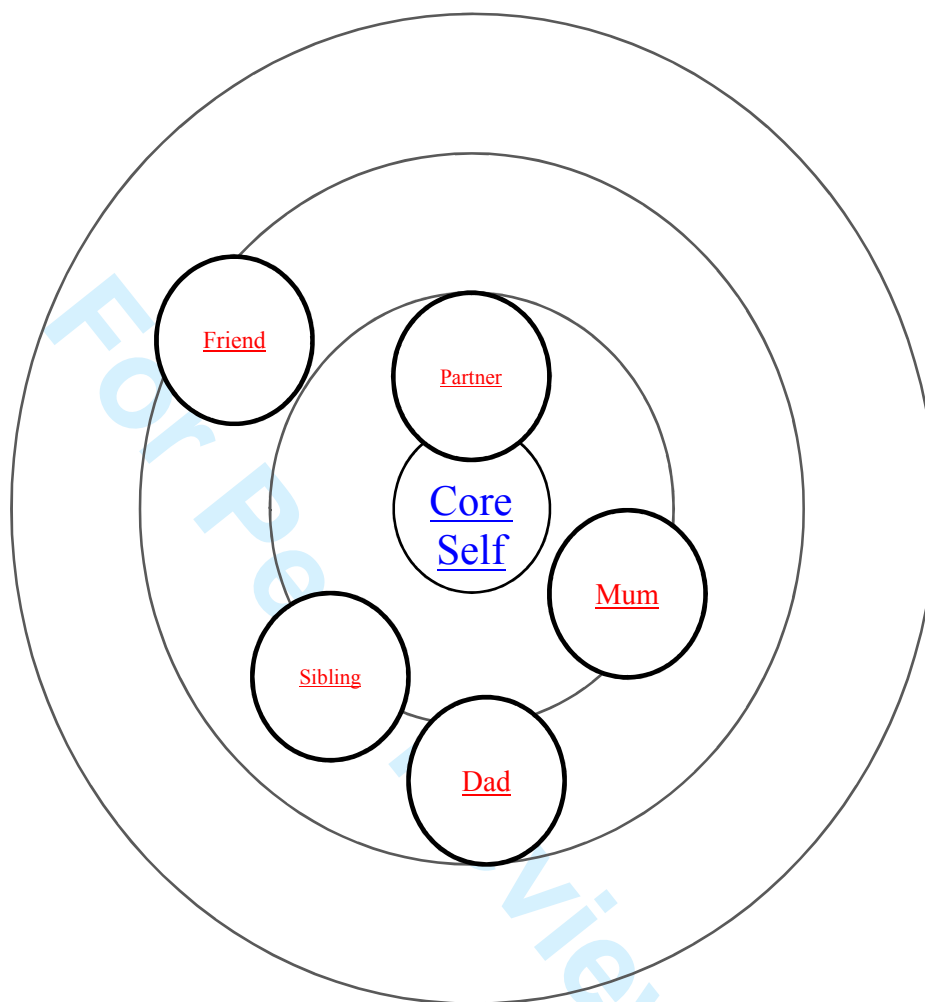


*Figure 1*. Distance of attachment figures from the core-self on the bull's-eye hierarchical

mapping technique.