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Romance and Reproduction Are Socially Costly

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Close social relationships provide the primary source of many important, beneficial forms of social support. However, such relationships can deteriorate without regular contact and communication and therefore entail maintenance costs. Consequently, the number of close network members that an individual can afford to maintain is likely to be constrained by factors such as the time they have to devote to servicing such relationships. New romantic relationships, despite providing large evolutionary benefits in the form of increased reproduction, may be unusually costly in this respect because the individual's attention is intensely focused on the partner, and, ultimately, their offspring. This change of focus may impact on other relationships, reducing the availability of help from kin and friends. We used an Internet sample of 540 respondents to test and show that the average size of support networks is reduced for individuals in a romantic relationship. We also found approximately 9% of our sample reported having an "extra" romantic partner they could call on for help, however these respondents did not have an even smaller network than those in just 1 relationship. The support network is also further reduced for those who have offspring, however these effects are contingent on age, primarily affecting those under the age of 36 years. Taking into account the acquisition of a new member to the network when entering a relationship, the cost of romance is the loss of nearly 2 members. On average, these social costs are spread equally among related and nonrelated members of the network.

Keywords: social network, support clique, support network, romantic relationships, relationship maintenance costs

Social networks are the core source of support for all social species. During times of crisis, for example, people benefit from having an adequate social network to provide sympathy and social, psychological, and financial support (Antonucci et al., 2002; Caplan, 1974; Cohen, 2004; Dickens et al., 2004; Hall & Nelson, 1996; Pilisuk & Froland, 1978; Schweizer, Schnegg, & Berzborn, 1998; Uchino, Holt-Lunstad, Smith, & Bloor, 2004; Uchino, Holt-Lunstad, Uno, & Flinders, 2001; Umberson, Chen, House, Hopkins, & Slaten, 1996; Walker, Macbride, & Vachon, 1977). Similar findings have been reported for free-ranging primates, where personal network size has been shown to correlate with number of surviving offspring for female baboons (Silk, Alberts, & Altmann, 2003; Silk et al., 2009) and the presence of close social allies reduces cortisol levels during stressful social events (Wittig et al., 2008). In humans, the bulk of this support derives from the innermost circle of intimate friends and relations (Sutcliffe, Dunbar, Binder, & Arrow, 2012; Vanderpoel, 1993), who typically average five in number (Dunbar & Spoors, 1995; Zhou, Sornette, Hill, & Dunbar, 2005).

As larger support networks appear to be beneficial to psychological, material, and physical well-being (Holt-Lunstad, Smith, & Layton, 2010), it seems surprising that people typically only average around five people in their support network (Dunbar & Spoors, 1995; Zhou et al., 2005). Why do humans not have larger support networks? The explanation may be that such

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ties are costly, to both acquire and maintain, and these costs have to be traded off against their potential benefits. For example, such valuable ties may be a resource that has to be competed for through recurring investment in time spent together and the trading of small favors in order to develop a sense of emotional closeness.

Emotional closeness is a metaphor for how an individual feels about another that can be consistently measured through various psychological instruments, suggesting that such feelings may reflect universal cognitive processes for interpersonal relationships (reviewed in Hruschka, 2010). Emotional closeness appears to capture how interdependent two individual's activities are and how willing an individual is to help another (Korchmaros & Kenny, 2001, 2006; Kruger, 2003), although this may not apply equally to kin and nonkin (Hackman, Danvers, & Hruschka, 2015). At the proximate level, a certain degree of emotional "closeness" (Berscheid, Snyder, & Omoto, 1989), or "oneness" (Cialdini, Brown, Lewis, Luce, & Neuberg, 1997) or "strength of tie," appears to regulate the availability of social, psychological, and financial support (Sutcliffe et al., 2012). Crucially however, it is also known to be a function of contact frequency, especially so for nongenetically related alters (Burton-Chellew & Dunbar, 2011; Pollet, Roberts, & Dunbar, 2013; Roberts & Dunbar, 2011a) and may therefore serve as an adaptive mechanism to allocate helping behaviors, especially among nonkin, toward those who have recently prioritized and invested in the focal individual.

In summary, helpful relationships therefore require sufficient emotional closeness, but emotionally close relationships require investment, take time to develop and are costly to maintain (Dindia & Canary, 1993; Roberts & Dunbar, 2011a; Saramaki et al., 2014). Friendships that are not serviced in this way decay rapidly (Burt, 2000; Oswald & Clark, 2003; Roberts & Dunbar, 2011b). Consequently, the number of individuals that can be called on is likely to be limited by variables such as population density and family size and time constraints (Dunbar, 2008; Milardo, Johnson, & Huston, 1983; Miritello et al., 2013; Stiller & Dunbar, 2007). When we cultivate one specific network tie, through communication and/or face-to-face contact, we necessarily neglect other or potential ties, that may be receiving attention from elsewhere. This may even apply cognitively, when no communication or contact is involved: if one is focused upon one relationship, one is less likely to be thinking about another. This leads social networks to be in a state of flux, with new ties being formed at the expense of old ones (Johnson & Leslie, 1982; Saramaki et al., 2014).

Romantic relationships would appear particularly costly to maintain, in both material and cognitive terms, in the sense that they typically involve an exclusive focus on one individual and concerted efforts to be close to them (Fisher, Aron, & Brown, 2006; Maner, Rouby, & Gonzaga, 2008; Murray, Holmes, & Griffin, 1996). Individuals in love expend considerably more energy thinking about the object of their love than about others (R. Hall et al., 1988; Hatfield & Sprecher, 1986; O'Leary, Acevedo, Aron, Huddy, & Mashek, 2012) and individuals (Western individuals at least) entering new romantic relationships appear to go through a phase of 'dyadic withdrawal' (Fischer, Sollie, Sorell, & Green, 1989; Johnson & Leslie, 1982; Milardo, 1982; Surra, 1985). This process involves a reshaping of both individual's social networks, as they become more emotionally attached to each other and each other's friends (Doherty & Feeney, 2004), at the risk of conflict with their current friends (reviewed in Hruschka, 2010).

We therefore hypothesize that these costs of romance will be realized through an impact upon other network ties and ultimately, in the degree of social support available. The increased focus on the new romantic relationship will inevitably mean that there is less emotional capital available for other relationships, and these partially neglected relationships may direct their attention elsewhere. This would represent a social cost (reduced likelihood of social support) that has to be traded off against the obvious evolutionary benefits of romantic relationships (increased reproduction). In one sense these costs could be seen as indicative of the benefits that romantic relationships offer. In evolutionary terms, we are selected to forgo these valuable relationships, which otherwise are likely to provide evolutionary benefits in the future through assistance and support, in exchange for reproductive benefits from a socially monogamous relationship.

The process of dyadic withdrawal can therefore be seen as an evolved adaptive response to

optimally manage one's investment in the social network, jeopardizing social benefits in exchange for a reproductive benefit by placing the romantic dyad at the center of one's social network. From the perspective of the neglected friends and relatives, they may become closer to other individuals who are showing them relatively more investment. Thus, even if those involved in romance still feel equally positive about their friends, their friends may not feel so inclined to provide assistance, representing the cost of romance.

If these social costs are great enough, then there may even be a reduction in support network size despite the addition of a supportive romantic partner (i.e., a loss of one or more ties). Alternatively, if the formation of support network ties is not limited by trade-offs but solely by exposure to potential ties and opportunities for recruitment, the fact that people often meet their romantic partners through friends and friends of friends (Fowler & Christakis, 2010) should mean that more 'connected' and 'popular' people will otherwise be more likely to meet a romantic partner. In this case, people in romantic relationships can be expected, all else being equal, to have larger support networks.

We therefore tested the hypothesis that individuals in active romantic relationships would have smaller support networks than those not in an active relationship. As further support for the importance of costs limiting support network size, we also tested the hypothesis that those with offspring will be disadvantaged with respect to their support network, despite their arguably greater need, due to the various costs of parenting. We utilize an online questionnaire to test these hypotheses by soliciting personal details about people's social support networks, their family structure and their romantic relationship status.

Method

We recruited participants primarily using two website depositories (http://psych.hanover.edu/research/exponnet.html and http://www.socialpsychology.org/expts.htm). In total, 540 individuals (428 women, 112 men) aged 18–69 years (Age: $M = 27.7$ years, $SD \pm 9.9$) completed our anonymous questionnaire. Of these, 427 were college-educated, and 363 were in a romantic relationship. Participants were not rewarded for taking part (though they may have received course credits in some cases).

Our questionnaire asked them to list everyone whom they felt they could approach for help in times of "severe emotional or financial crisis," following Dunbar and Spoors (1995). Respondents (for which we use the standard network term *ego*) were invited to list up to 15 such individuals (for which we use the standard network term *alters*). Respondents specified how each of these alters was related or known to them. We also solicited brief personal details as control covariates: gender, age (which we mean centered), and whether or not they were in full time education. We also solicited details about their family size as, such as whether their mother and father were alive or not and how many genetically related siblings they had, as it could be argued that people from larger families will have more people to obtain support from.

To test our hypothesis that costly relationships impact upon other network ties, we asked them if they were in an active romantic relationship and if they had any offspring. Because our respondents could list in their support network any 'extra' romantic partners they believed they could rely on for support, this allowed us to explore the possibility that those involved in more than one romantic relationship may bear even greater costs.

We conducted our analyses in IBM SPSS Statistics (Version 21). Support network size was our dependent variable (bounded between a minimum size of 1 and a maximum size of 15). We used generalized linear models, with a binary-probit link, hybrid parameter estimation with Pearson chi-square scale method, and robust estimator for the covariance matrix. We tested whether support network size was affected by whether individuals were in a romantic relationship and whether they had offspring, controlling for the above covariates. We use the following model selection criteria to choose among competing models: Akaike's information criterion (AIC), finite sample corrected AIC (AICC), Bayesian information criterion (BIC), consistent AIC (CAIC), and likelihood ratio tests between competing models to determine whether more complex models were justified.

Results

Mean support network size was 5.25 ($SD \pm 3.2$; range 1–15. See Figure 1). Overall, respondents in romantic relationships on average had significantly smaller support networks than respondents who were single. All our forms of model selection criteria (AIC, AICC, BIC, CAIC, likelihood ratio test) supported our hypothesis that those in romantic relationships have smaller support networks (see Table 1, Model 2 vs. Model 1). Specifically, a model containing all our control covariates was favored over the simple baseline intercept model, and suggested that those with a live mother tended to have a larger support network (see Table 1, Model 1 vs. Model 0). However, this covariates model was inferior to a model containing an additional term for relationship status (likelihood ratio test: 17.596, $df = 1$, $p < .001$).

A small number of respondents ($n = 32$) listed an extrapair romantic relationship as one of their support network, providing a rough lower bound estimate on the rate of affairs (9% of the 363 individuals currently in romantic relationships). We tested whether the extra demands of maintaining an additional romantic relationship had a further added adverse effect on support network size. We substituted our relationship status term with one that coded participants as in 0, 1, or 2 relationships. However none of our model selection criteria favored this increased model complexity (see Table 1, Model 3 vs. Model 2) and the parameter estimate for those with two partners was not significantly different to those with just one partner. One reason for this is that most individuals who listed an extrapair partner did not list their primary partner in their support network: of the 32 egos that listed an extra romantic partner, only five listed their primary romantic partner as someone they could rely on for support, suggesting a substantial deterioration of the former relationship, which could be either the cause or the result of the extra relationship.

As age is often reported to affect measures of social networks (Hill & Dunbar, 2003; van Tilburg, 1998; Wrzus, Hanel, Wagner, & Neyer, 2013), we also tested if the negative effect of a primary romantic relationship depended on age. We found that a model with an interaction term for age and relationship status was justified by all our model selection criteria (see Table 1,

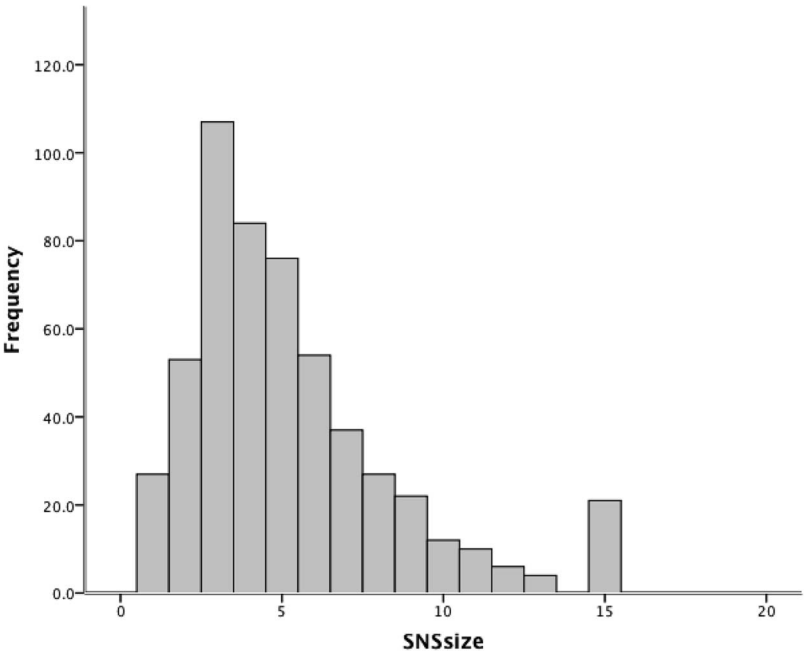

Figure 1. Distribution of support network size.

Table 1
A Generalized Linear Model of Support Network Size (N = 530)

Term	Model 0	Model 1 *B* (*SE B*)	Model 2 *B* (*SE B*)	Model 3 *B* (*SE B*)	Model 4 *B* (*SE B*)	Model 5 *B* (*SE B*)	Model 6 *B* (*SE B*)
Intercept	−0.385 (0.0247)***	−0.533 (0.1033)***	−0.445 (0.1099)***	−0.578 (0.1049)***	−0.450 (0.1100)***	−0.464 (0.1101)***	−0.523 (0.1032)***
Gender (male)		−0.53 (0.0603)	−0.060 (0.0604)	−0.058 (0.0605)	−0.065 (0.0604)	−0.090 (0.0593)	−0.082 (0.0593)
Age (mean centered)		−0.039 (0.0267)	−0.029 (0.0266)	−0.027 (0.0271)	−0.123 (0.0420)*	−0.054 (0.0460)	0.036 (0.0334)
In education (yes)		−0.073 (0.0601)	−0.078 (0.0603)	−0.080 (0.0603)	−0.092 (0.0597)	−0.047 (0.0629)	−0.026 (0.0632)
Mum alive (yes)		0.172 (0.0821)	0.172 (0.0826)**	0.172 (0.0823)**	0.160 (0.0826)*	0.169 (0.0838)**	0.181 (0.0835)**
Dad alive (yes)		0.078 (0.0609)	0.079 (0.0619)	0.080 (0.0620)	0.083 (0.0627)	0.100 (0.0621)	0.097 (0.0606)
Number of genetic siblings		−0.002 (0.0110)	−0.001 (0.0109)	−0.001 (0.0109)	0.001 (0.0109)	0.006 (0.0109)	0.006 (0.0110)
In relationship (yes)			−0.129 (0.0550)**		−0.112 (0.0545)**	−0.079 (0.0554)	
Double–Romance (none vs. one)				0.135 (0.0557)**			
Double–Romance (double vs. one)				0.053 (0.1077)			
In relationship (yes) × Age					0.141 (0.0486)***	0.138 (0.0481)***	
Offspring–binary (yes)						−0.248 (0.0667)***	−0.270 (0.0658)***
Information Criterion							
AIC	3248.186	3221.840	3206.245	3207.575	3187.693	3149.312	3174.334
AICC	3248.186	3221.854	3206.262	3207.597	3187.715	3149.34	3174.352
BIC	3255.185	3270.837	3262.242	3270.572	3250.690	3219.309	3230.331
CAIC	3256.185	3277.837	3270.242	3279.572	3259.690	3229.309	3238.331
Log likelihood	−1623.093	−1603.920	−1595.122	−1594.788	−1584.847	−1564.656	−1579.167
Likelihood ratio test (*df*)	n/a	38.35 (6)***	17.596 (1)***	0.668 (1)	20.550 (1)***	40.382 (1)***	29.022 (2)***
Comparison	n/a	M1 over M0	M2 over M1	M3 over M2	M4 over M2	M5 over M4	M5 over M6

Note. AIC = akaike information criterion; AICC = finite sample corrected AIC; BIC = Bayesian information criterion; CAIC = consistent AIC.
* $p < .10$. ** $p < .05$. *** $p < .01$.

Model 4 vs. Model 2). The parameter estimates suggested that while increasing age had a negative effect upon support network size for single people ($B = -0.123 \pm 0.0420$), it had negligible effect for those in a relationship ($B = 0.018 \pm 0.0486$) (see Figure 2, Table 1, Model 4).

As predicted by our hypotheses, the costs of parenting also appear to have a negative effect upon support network size, with all our model selection criteria supporting a model that contained a binary variable for the Ego having offspring or not (see Figure 3; Table 1, Model 5 vs. Model 4). The parameter estimates suggest that the costs of offspring are particularly large, larger than the effects of being in a relationship, although the effect of relationship-status by age is still significant. To check that the effect of being in a relationship was not simply due to a correlation with having offspring, we compared our model containing relationship status and offspring status to a simpler model with just the offspring variable. We found that the simple model was not favored, suggesting that both romantic relationships and offspring are independently costly.

Further support for the costs of romantic relationships comes from models on a subset of the data, excluding all egos that have offspring. Here again we find that a model with relationship status is favored over the baseline covariate model (see Table 2, Model 2 vs. Model 1), and that there is still an interaction with age (see Table 2, Model 3 vs. Model 2). As an aside, while the covariates were not part of our analysis or hypothesis testing, it appears that in general family size, along with gender and educational status, had little or no impact upon support network size, although a living mother was generally significantly beneficial (see Table 1 and Table 2).

Finally, we investigated whether kin or nonkin are more likely to drop out of the support network as a result of a romantic relationship. We did this by comparing if relationship status affected either the absolute number of related alters (see Table 3), or unrelated alters (excluding relationship partners) in the support network. To avoid the complications of the interaction between age and relationship status, we restricted these analyses to those less than 36 years of age (which meant the interaction term was no longer significant). We found that the effects of being in a relationship were significantly negative for both related and unrelated members from the support network (related alters: $B = -0.229 \pm 0.0481$; unrelated alters: $B = -0.218 \pm 0.0663$, see Table 3). The same was true for the effect of having offspring (unrelated alters: $B = -0.268 \pm 0.0927$; related alters: $B = -0.216 \pm 0.0678$).

Overall, in absolute terms, the mean number of alters in the support network for those less than 36 years of age dropped by 0.8 alters from 6.2 to 5.4 for those in a relationship, and a further 1.2 alters for those in a relationship with offspring. More specifically, related alters in the support network for those less than 36 years of age dropped by 1.0 alters from 3.6 for single egos to 2.6 for those in a relationship, and by a further 0.7 alters, from 2.6 to 1.9 for those in a relationship with offspring (see Figure 3, Table 4). Likewise, the mean number of unrelated alters (excluding romantic partners) dropped by 0.6 alters from 2.6 for single egos to 2.0 for those in a relationship, and by a further 0.5 alters to 1.5 for those also with offspring. Considering that the average effect of being in a relationship was a loss of 0.8 alters, and that those in romantic relationships tended to list their romantic partner in their support network (70%, 201 of 291 respondents under 36 years old and in a relationship), means that the average effect of a romantic relationship was a loss of nearly 2 alters in exchange for a gain of

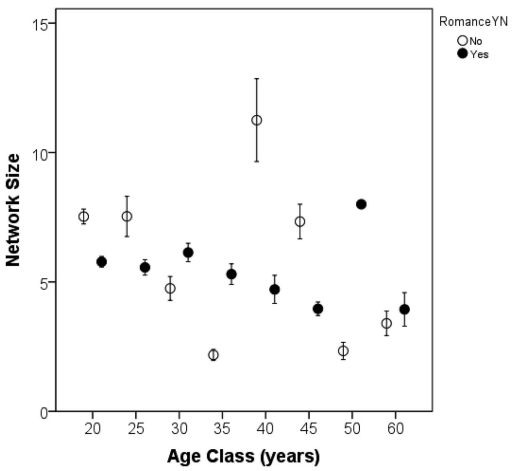

Figure 2. Mean (±*SE*) of support network size as a function of 5-year age class for those in (solid symbols) and those not in (open symbols) a romantic relationship.

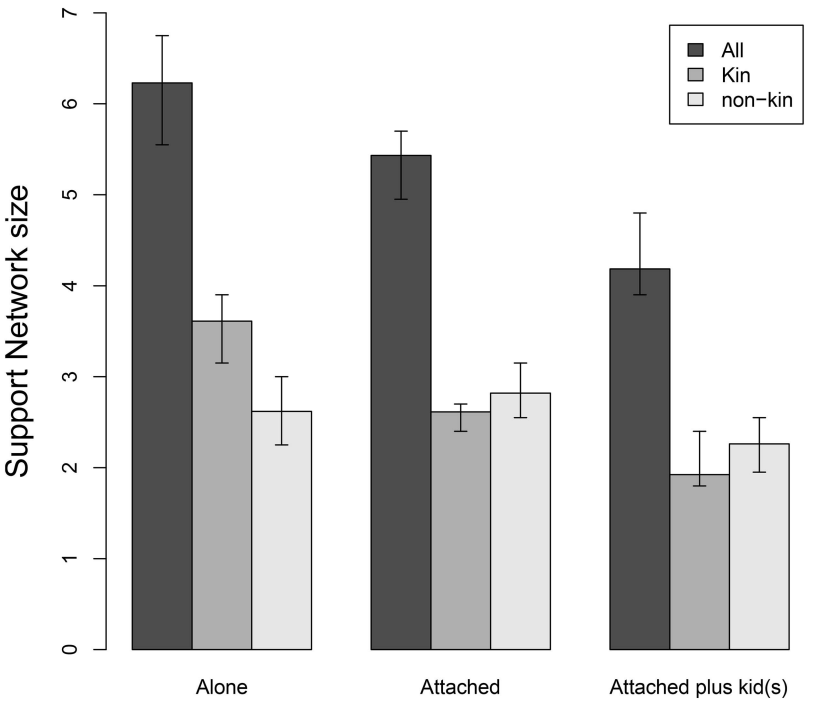

Figure 3. Mean ± 95% confidence intervals support network size, shown in total and subdivided into kin and nonkin components, by relationship status and family status for those less than 36 years of age. Romantic partners, when listed in the support network, are included under non-kin. Alone (single, without offspring; $N = 139$); attached (in romantic relationship but without offspring; $N = 199$); attached (in romantic relationship with offspring; $N = 92$).

approximately one additional alter (the exact figures being −1.6 vs. +0.8).

Discussion

As predicted, respondents in romantic relationships had significantly smaller support networks than single respondents, suggesting that the benefits of social monogamy come at the expense of reduced social support. However, our result was only true for younger (<36 years) subjects, since older subjects exhibited the reverse pattern because the networks of single people appear to decrease with age. Overall, the average number of support network members that our respondents had was 5.25 (range 1–15), a value virtually identical to those previously reported for this layer of the social network (Dunbar & Spoors, 1995; Hill & Dunbar, 2003; Zhou et al., 2005). Within this, younger respondents typically had slightly larger ($M = 6.31$) and older ones slightly smaller ($M = 4.85$) networks. Aside from providing further confirmation of the size of this particular network layer, these results also indicate that our sample is not atypical, despite the fact that it was skewed toward a younger age range than previous samples.

As also predicted, those with offspring also had even smaller support networks, suggesting that the costs of relationships and offspring are additive. Of course this does not imply a net cost in evolutionary terms, since the romantic partner provides both social support and reproductive opportunities. In terms of psychological well-being, it would be interesting to know if romantic partners provide sufficient support to negate the loss of social support from others, especially in contemporary settings. The fact that the number of siblings appears to be unrelated to network size reinforces the suggestion that network size is constrained by costs as well as 'supply,' rather than simply being a matter of adding on the average number of 'friends'

Table 2
A Generalized Linear Model of Support Network Size Among Those Without Offspring (N = 367)

Term	Model 1 *B* (*SE B*)	Model 2 *B* (*SE B*)	Model 3 *B* (*SE B*)
Intercept	−0.571 (0.1341)***	−0.477 (0.1450)	−0.514 (0.1451)***
Gender (Male)	−0.074 (0.0702)	−0.083 (0.0707)	−0.086 (0.0706)
Age (mean centered)	0.012 (0.0527)	0.028 (0.0533)	−0.075 (0.0707)
In education (yes)	−0.016 (0.0810)	−0.024 (0.0818)	−0.026 (0.0812)
Mum alive (yes)	0.213 (0.1130)*	0.203 (0.1149)*	0.192 (0.1168)
Dad alive (yes)	0.112 (0.0796)	0.118 (0.0816)	0.115 (0.0827)
Number of genetic siblings	0.001 (0.0162)	0.001 (0.0160)	0.001 (0.0158)
In relationship (yes)		−0.132 (0.0625)**	−0.064 (0.0709)
In relationship (yes) × Age			0.155 (0.0857)*
Information Criterion			
AIC	2240.193	2228.671	2221.497
AICC	2240.214	2228.697	2221.530
BIC	2286.487	2281.578	2281.017
CAIC	2293.487	2289.578	2290.017
Log likelihood	−1113.097	−1106.336	−1101.748
Likelihood ratio test (*df*)	21.364 (6)***	13.522 (1)***	9.176 (1)***
Comparison	M1 over M0	M2 over M1	M3 over M2

Note. AIC = akaike information criterion; AICC = finite sample corrected AIC; BIC = Bayesian information criterion; CAIC = consistent AIC; M0 = intercept only model.
* $p < .10$. ** $p < .05$. *** $p < .01$.

to however many close kin Ego happens to have.

Our study was not longitudinal and thus did not record direct changes to support networks. We therefore cannot exclude the possibility that the respondents who were in romantic relationships happened to be those who are relatively unsocial (in the case of younger subjects), and thus had smaller support networks because of a personality trait rather than the romantic relationship. However, such an explanation would also have to extend to the probability of having offspring, and this would still support the suggestion that evolutionary trade-offs select for different strategies, specifically, many ties of relatively low investment versus few of high investment. Either way, costs would seem important, and a recent cross cultural study has found that in both India and the United States, those in romantic relationships do invest more in their partners than in other nonkin, even when controlling for emotional closeness, supporting our proposed mechanism (Hackman et al., 2015).

For younger respondents, the support networks of romantically involved respondents had approximately one less member than those of individuals who were not romantically engaged. Since a new romantic partner rarely comes from one's innermost circle of intimates, this implies an effective loss of two alters when we take on a romantic partner (the real reduction in support networks for younger respondents is not from six to five but from six to four, plus-the-new-romantic-partner). It seems that the acquisition of a romantic partner typically displaces a close relative from the support network as well as an unrelated friend (i.e., one of each category of relationship: see Table 4).

We have previously shown that if time devoted to a close friend is reduced, the emotional closeness of that relationship drops precipitously and relatively quickly (within as little as 6–9 months) (Roberts & Dunbar, 2011b). The loss of these two intimates thus represents the cost of a romantic relationship. It is an open question whether these costs in terms of reduced support are fully negated by the acquisition of a disproportionately supportive romantic partner who makes a larger support network redundant, or whether the costs are a necessary price for access to the reproductive benefits of a romantic relationship.

As the support network comprises both kin and nonkin, the loss of around two members from the support network could occur in one of

Table 3
A Generalized Linear Model of Support Network Size

Term	Model 1 *B* (*SE B*)	Model 2 *B* (*SE B*)	Model 3 *B* (*SE B*)
	Egos under 36 years old (n = 442) and related alters only		
Intercept	−1.098 (0.0990)***	−0.887 (0.0998)***	−0.859 (0.0977)
Gender (Male)	−0.025 (0.0497)	−0.047 (0.0501)	−0.070 (0.0493)
Age (mean centered)	−0.162 (0.0447)***	−0.092 (0.0426)**	0.006 (0.0531)
In education (yes)	−0.044 (0.0594)	−0.053 (0.0590)	−0.007 (0.0595)
Mum alive (yes)	0.094 (0.0816)	0.073 (0.0736)	0.057 (0.0706)
Dad alive (yes)	0.104 (0.0604)*	0.104 (0.0625)*	0.122 (0.0602)**
Number of genetic siblings	0.001 (0.0092)	0.003 (0.0089)	0.007 (0.0089)
In relationship (yes)		−0.250 (0.0484)***	−0.229 (0.0481)***
Offspring–binary (yes)			−0.216 (0.0678)***
Information Criterion			
AIC	1799.897	1760.795	1746.840
AICC	1799.914	1760.817	1746.868
BIC	1847.493	1815.190	1808.035
CAIC	1854.493	1823.190	1817.035
Log likelihood	−892.949	−872.398	−864.420
Likelihood ratio test (*df*)	n/a	41.02 (1)***	15.956 (1)***
Comparison	n/a	M2 over M1	M3 over M2
	Egos under 36 years old (n = 441[a]) and unrelated alters only (excluding relationship partners, when listed)		
Intercept	−0.990 (0.1666)***	−0.785 (0.1789)***	−0.750 (0.1829)***
Gender (Male)	−0.037 (0.0786)	−0.058 (0.0783)	−0.083 (0.0792)
Age (mean centered)	0.026 (0.0625)	0.096 (0.0641)	0.212 (0.0707)***
In education (yes)	−0.133 (0.0814)	−0.139 (0.0801)*	−0.086 (0.0826)
Mum alive (yes)	0.082 (0.1364)	0.059 (0.1361)	0.039 (0.1364)
Dad alive (yes)	0.032 (0.0804)	0.032 (0.0811)	0.054 (0.0815)
Number of genetic siblings	−0.029 (0.0138)**	−0.026 (0.0136)*	−0.020 (0.0136)
In relationship (yes)		−0.242 (0.0660)***	−0.218 (0.0663)***
Offspring–binary (yes)			−0.268 (0.0927)***
Information Criterion			
AIC	1974.496	1943.365	1923.480
AICC	1974.513	1943.387	1923.507
BIC	2022.076	1997.741	1984.654
CAIC	2029.076	2005.741	1993.654
Log likelihood	−980.248	−963.682	−952.740
Likelihood ratio test (*df*)	n/a	33.132 (1)***	21.884 (1)***
Comparison	n/a	M2 over M1	M3 over M2

Note. AIC = akaike information criterion; AICC = finite sample corrected AIC; BIC = Bayesian information criterion; CAIC = consistent AIC.
[a] One participant recorded only their partner so was therefore not a valid case here.
* $p < .10$. ** $p < .05$. *** $p < .01$.

three ways: by losing two family members, two friends or one of each. Each option will have different costs and benefits. Family relationships are more robust in the face of reduced contact than friends (Roberts & Dunbar, 2011b), so it might seem sensible to risk neglecting them and preserve the more fragile friendships; however, close family are not only more likely to support you under all circumstances, but, as in other primates (Silk et al., 2003; Silk et al., 2009), they are probably the single most important factor in lifelong reproductive and social success. On the other hand friends, although being more susceptible to rapid relationship decay, are probably more valuable than kin in providing emotional support and also in other ways (reviewed in Hruschka, 2010). If it is true that friends are

Table 4
Means (Standard Deviations in Parentheses) of Number of Relevant Alters in the Support Network for Those Under 36 Years of Age by Relationship Status and Parental Status

Status	*n*	Support Network	Kin	Non-Kin	Non-Kin[a]
In relationship (No)	139	6.23 (3.729)	3.61 (2.466)	2.62 (2.348)	2.62 (2.348)
In relationship (Yes)	199	5.43 (2.744)	2.61 (1.493)	2.82 (2.188)	2.01 (2.057)
Yes & with kids	92	4.18 (2.693)	1.92 (1.598)	2.26 (2.059)	1.53 (1.986)
No & with kids	12	4.50 (3.555)	2.58 (1.505)	1.92 (2.429)	1.92 (2.429)
Total	442	5.40 (3.177)	2.78 (1.968)	2.61 (2.226)	2.01 (2.178)

[a] Non–kin minus the relationship partner when listed.

quicker to drop their support in response to neglect, then the loss of equivalent kin and nonkin suggests that individuals are actually neglecting their kin more, in behavioral terms, than their friends upon entering a romantic relationship, but losing equal amounts of kin and nonkin alters.

Johnson and Leslie (1982) also found, in a cross-sectional study, that close network size decreases as a romantic relationship becomes more committed, although, in contrast to the present results, they found that kin relationships were preserved and only friendships bore the cost of this. This difference to our results may reflect the different measures used. We asked if respondents felt they could rely on someone for help in a crisis, whereas Johnson and Leslie (1982) asked respondents whose opinions they valued. Married respondents reported that their friends' opinions were less important to them, and that they disclosed less to their friends, than individuals in less committed relationships. A similar drop in network size occurs during the transition to motherhood (McCannell, 1988). Longitudinal studies comparing casual dating, regular dating, exclusive dating, pre-engagement and engagement relationships have reported a progressive decrease in the frequency and duration of actual interactions (Milardo et al., 1983). Similar findings have been reported in baboons as mother's time budget's become stressed by the feeding demands of their infants: they progressively drop casual friendships in order to preserve relationships with their female kin (Altmann, 1980; Dunbar & Dunbar, 1988).

Increasing age appears to be associated with decreasing support network size, unless one is in a relationship. Romantically attached individuals in our sample had a constant mean support network size of around 5 to 6 individuals regardless of their age. This suggests that while the costs of a relationship are initially considerable, they may buffer one against a declining support network as one ages (perhaps because some of the costs of maintaining a relationship are shared between the couple). Older, single, individuals may be increasingly isolated as friends partner off and no longer invest in them to the same degree, and later in life, as family members die off and are not replaced. It would be interesting to know if older, single, individuals, with smaller support networks, are immune to the costs of a new romance, because their core network retains space capacity to include a romantic partner without placing excessive stress on their existing close relationships.

Although entering a romantic relationship is costly (with regards to the support network), entering a secondary romantic relationship (i.e., having an extrapair mating partner) does not appear to double the burden: those with two relationships do not lose a further two intimates, at least in the case of female respondents (the sample of males being too small to provide reliable estimates of effects). Those respondents who reported being in two romantic relationships (partner plus extrapair partner) did not differ in terms of support network size from those in exclusive romantic relationships; nor did their support networks differ from those of single romantic partner respondents in terms of the balance between kin and friends.

The most likely explanation for this is that their original relationship had deteriorated to the extent that the primary romantic partner had been dropped from the circle of intimates (Sutcliffe et al., 2012) and thus did not impose a further drain on support network man-

agement. This could be interpreted as implying that humans find it emotionally and socially difficult to run more than one committed romantic relationship at a time. Note that our data on extrapair relationships imply a double-mating frequency of about 32/363 ≈ 9%. This is of about the same order of magnitude as the frequency estimated from genetic nonpaternity (3–13%) (Anderson, 2006; Baker & Bellis, 1995; Wellings, Field, Johnson, Wadsworth, & Bradshaw, 1994).

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