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Expected Utility in Romantic Relationships: Satisfaction as a Cue for Romantic Partnership Dissolution

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Abstract

The choice to enter and leave a romantic relationship can be framed as a decision-making problem based on expected utility of the partnership over time, akin to a forager deciding whether to stay in a particular patch based on the amount of resources it provides. We examined the temporal trajectory of three traits that may correspond to resources in romantic relationships—trust, love, and satisfaction—to determine whether they behave like depleting or replenishing patches from a foraging perspective. All three rise over time in intact relationships—suggesting replenishment—but plateau or fall in dissolved relationships—suggesting depletion. Survival analysis demonstrated that higher ratings of all three quality variables decreased the risk of romantic dissolution. The results suggest that these cues are lower in dissolved relationships, indicating individuals could potentially use them as cues for leaving an unsatisfactory relationship patch via aspiration-level cognitive mechanisms.

Keywords: foraging theory; romantic relationships; survival analysis; relationship dissolution; mate choice

All good things must come to an end, including romantic relationships. In some cases, it is not until death that we part, but many relationships end before that point through someone's active choice. Relationship dissolution is a high-intensity and long-lasting stressor (Simpson, 1987; Sprecher, 1994), indicating that avoiding it is important to people. Yet most people seem to enter relationships that eventually end and are often caught off-guard when it occurs, indicating that it can be difficult to predict. Individuals cannot usually determine the expected outcome of a relationship prior to entering the relationship itself, meaning they may continuously evaluate their relationship and decide whether one's relationship is likely to (or should) end. Previous work in this choice domain has tackled the brighter side of romance, such as how individuals choose a relationship partner (e.g. Beckage, Todd, Penke, & Asendorpf, 2009), but less work has examined how individuals decide to move on. What cues do individuals consider when choosing to end a relationship, and how are they incorporated into choices?

How long to stay with something typically depends on what one is getting out of it. Individuals clearly expect to get something out of romantic relationships, given that many expend significant time, money, and energy searching

for and maintaining them. The best-studied aspects of relationship quality (or utility) include relationship satisfaction, intensity of love, and level of trust. Meta-analyses have found that measures of relationship quality more strongly influenced relationship dissolution than either individual traits (e.g. neuroticism) or external factors (e.g. social network overlap; Le et al., 2010). Daters may thus consider the amount of utility, quality, or other valued attribute produced in a relationship when choosing whether to exit it and attempt to find a better relationship. This utilitarian view departs from the traditional cultural emphasis on the holistic nature and complexities of romance. However, for a significant portion of human history, relationships were designed to be mutually beneficial to a couple and their extended families, and relationships with little expected gain were avoided.

It is not novel to suggest individuals attempt to get the best relationship possible (whatever that might be), but few have connected the study of romantic relationships to theoretical models of choice. Problems involving searching for and maximizing resources are well studied within the foraging literature in biology. Optimal foraging theory (OFT; Stephens & Krebs, 1986) considers how foragers maximize their total gain (e.g. calories) in an environment. Foragers traverse a landscape filled with patches of some resource (e.g. berry bushes), choosing to enter and obtain (e.g. consume) those resources before leaving to find new or better patches. The relationship-foraging model (Cohen & Todd, 2017) treats the search for successive relationships as a foraging problem. Entering a relationship could be thought of as entering a "patch" that provides some mix of satisfaction, love and other benefits. Relationship foragers search through a social landscape of potential romantic partners, choosing to pass by some, entering into a relationship with others (and reaping the benefits), and possibly eventually departing in search of another. Depending on just what sort of patch a relationship is like, OFT can make predictions about how long people should stay in the relationship patches they find.

One commonly-studied type of patch is characterized by resources that are depleted over time as the forager consumes them. Berry bushes are a common example of this type of patch, with the ripe berries being continually consumed until the forager decides to leave. For these

bushes, the rate of return (e.g. calories consumed per unit time) is expected to increase rapidly early on as a forager enters a patch, with a diminishing rate of return as resources are consumed. The Marginal Value Theorem (Charnov, 1976) in OFT states that individuals should leave such depleting patches when the rate of return within the current patch is less than the rate of return that is expected from the environment at large, given optimal search behavior and expected search costs.

But not all patches only deplete over time—some may deplete and replenish (such as a berry bush with new berries ripening across weeks), and some may produce a roughly constant output for extended periods. Immobile barnacles settled on a tide-pool rock capturing food floating past are partaking of such long-lasting patches. These and other animals are known as sit-and-wait foragers (Beachly, Stephens, & Toyer, 1995), as once they have found a patch location of this non-depleting type they can stay there exploiting it for a long time. In such situations, “simply staying put can make good economic sense” (p. 265), but leaving is also predicted when patch quality declines or other circumstances change, such that the forager could get a better rate of return by looking (and exploiting) elsewhere.

How do relationships compare to these types of patches? Some aspects seem typically to start high and deplete over time, such as the novelty of a new partner. But others do not appear to be capped—there is probably no preset amount of satisfaction, love, or trust that one can get in a relationship, unlike the fixed number of ripe berries currently in a bush. This suggests that various measures of relationship quality may not only fall but also can replenish over time, and can even stay level or grow indefinitely.

It is important for specifying the relationship-foraging model to determine whether any aspect of relationship quality follows the assumptions of OFT regarding particular types of patchy resource, whether depleting, or replenishing, or constant. A depleting patch should show high (or rapidly growing) initial rate of return, then falling over time. A replenishing patch would have a rate of return that falls and rises, possibly repeatedly. Finally, a constant patch would have a rate of return that rises (possibly very quickly) to a roughly steady state.

In this work, we assess ratings of three types of quality in a romantic relationship: satisfaction, love, and trust. We examine how these factors change over time, to determine which may be useful in predicting relationship dissolution given different patch definitions in the relationship-foraging model. The data come from self-reports from intact and dissolved romantic relationships.

Previous research has demonstrated that aspects of quality, especially satisfaction, tend to increase dramatically at the start of a relationship (Rusbult, 1983) followed by relative stability or decreasing levels over time (Levenson & Gottman, 1985; Rusbult, 1983; Sprecher, 1999). In one of the rare longitudinal works, satisfaction and commitment to the relationship increased over time (Rusbult, 1983). Sprecher (1999) measured several aspects of quality at

yearly intervals in couples and found the opposite result: Satisfaction was significantly lower for both genders and love was significantly lower for men at the first yearly interval, but otherwise, ratings were remarkably stable. Only the longest-lasting couples (those lasting the full 4 year study period) reported an increase in quality, with a slight increase in commitment and satisfaction for women in the final year. Thus, we expect that longer-lasting relationships will report greater satisfaction, and possibly other quality variables such as trust, although this pattern will not hold for love beyond the earliest time points.

These trajectories diverge depending on the eventual relationship outcome. Among relationships remaining intact (at least, during the duration of a particular study), satisfaction and commitment stabilize or slowly increase over time (Rusbult, 1983; Sprecher, 1999). Individuals exiting a dissolved relationship report decreased satisfaction but only slight decreases in love, suggesting relationships tend to end due to changes in satisfaction rather than love (Sprecher, 1994; Sprecher 1999). These diverging paths lead to large disparities in commitment and satisfaction between couples remaining intact and those ending (Rusbult, 1983; Simpson, 1987). Hence, we expect that reports on satisfaction and trust, but not love, to be higher for intact than dissolved couples.

In the next section we analyze the time-course of self-reported ratings of different types of relationship quality, to assess their similarity to rates of return for depleting, replenishing, and constant patches. We then use survival analysis to test whether these self-reported aspects of quality influence the likelihood of exiting a relationship (i.e., leaving a relationship patch).

Method

A survey was used to assess relationship length versus quality of intact and dissolved romantic relationships in undergraduates. All procedures were approved by the Indiana University Institutional Review Board.

Participants

A sample of 700 undergraduates was collected from the Indiana University psychology subject pool. To qualify, participants needed to have at least one romantic experience, including but not limited to casually going on dates, being in a committed relationship, or getting married. Forty-five participants who indicated they had never been in any sort of romantic relationship or did not indicate whether they were in a relationship currently were not included in the analyses. Of the remaining 655 participants, 62.0% were currently in a romantic relationship. All 655 participants indicated the type of relationships they were giving us ratings for (whether their current relationship or their most recent dissolved relationship); 50.8% were describing committed relationships (but not engaged or married), 44.4% were casual relationships and early relationships without a clear classification, 2.4% were engaged or married, and the remaining 2.3% fell outside these

categories. Of participants primarily identifying with a single racial group ($n=616$), 72.1% identified as white, 14.90% as Asian, 8.1% as black, and 4.9% as Hispanic or Latino. Subjects were primarily heterosexual (91.3%) females (58.6%) between the ages of 18-21 (90.2%). Participants were compensated with course credit.

Measures

Participants completed a survey for approximately 30 minutes online through Qualtrics. Participants currently in a romantic relationship (*intact* couples) were asked to describe various qualities of their current relationship. Individuals not currently in a relationship were asked to imagine their most recent romantic relationship prior to its dissolution (*dissolved* couples). Duration of the relationship was measured from its current state (for intact couples) or its final duration (for dissolved couples) in months ($n=395$) and month- and year-based categorical bins ($n=655$) (see Figure 1).

Participants reported three measures of relationship quality on Likert scales:

- Love: “How in love with your partner are you?”
- Trust: “How much do you trust your partner?”
- Satisfaction: “In general, how satisfied are you with your current relationship with your partner?”

Love was measured only for participants indicating they were in love with their partner (meaning a rating is not available for all participants) and ranged from 1 (not very) to 9 (intensely) ($n=391$, $M=7.55$, $SD=1.50$). Trust ranged from 1 (not at all) to 9 (completely) ($n=655$, $M=6.79$, $SD=2.05$). Relationship satisfaction ranged from 1 (extremely dissatisfied) to 7 (extremely satisfied) ($n=655$, $M=5.33$, $SD=1.75$). The upper endpoint for the satisfaction scale was different from the other two scales because satisfaction is typically measured on a bipolar 7-point scale (e.g. Simpson, 1987), so scores are compared only via correlations.

Results

To determine whether love, trust, or satisfaction follow appropriate rate of return curves to be considered depleting, replenishing, or constant resources as found in foraging theory, we plotted their mean trajectories over categorical duration groups (see Figures 2, 3, and 4, respectively). Note that each of these trajectories are constructed across subjects, as we only have zero or one data point on each scale from each subject. Love (Pearson’s R , $r=0.20$, $n=222$, $p=.003$) and trust ($r=0.11$, $n=395$, $p=.02$) both weakly but significantly positively correlated with relationship duration, but satisfaction did not ($r=0.03$, $n=395$, $p>.05$). This suggests that love and trust are generally higher at longer relationship durations, while satisfaction is relatively stable. The variables were highly intercorrelated, with significant, moderate relationships between love and trust ($r=0.51$,

$n=391$, $p<.001$), love and satisfaction ($r=0.29$, $n=391$, $p<.001$), and trust and satisfaction ($r=0.48$, $n=655$, $p<.001$).

While love showed a dramatic increase over the first few months, in line with our prediction, each variable overall tended to continually increase slightly as duration grew, rather than forming a curve of diminishing returns with a plateau (although the curve of trust beyond one year might be described as a plateau).

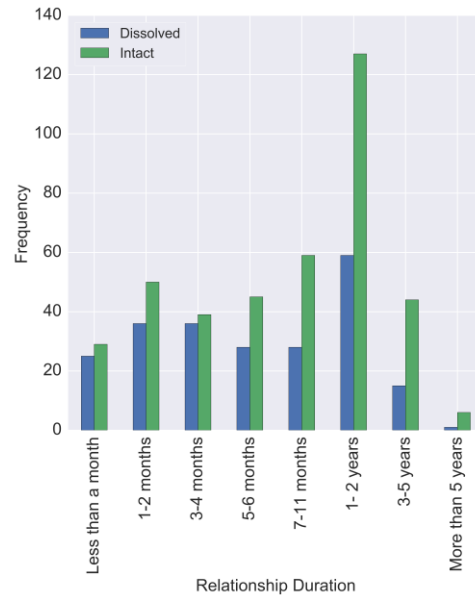


Figure 1: Distribution of relationship lengths for both dissolved and intact relationships.

Comparing dissolved and intact couples’ ratings of each variable, intact couples generally had equal or greater quality across relationship durations with lower variability. Looking at all time points together, there was also greater quality for intact over dissolved relationships as a whole (Independent Samples T-Test, love: $t(391)=5.11$, trust: $t(655)=10.02$, satisfaction: $t(655)=9.58$, all $p <.001$).

The rapid initial rise in love overall is driven largely by ratings of dissolved relationships, which start at much lower levels before plateauing. Intact relationships vary in love by little more than a point across durations. This is somewhat surprising—were the data longitudinal, we could conclude that individuals experiencing strong feelings of love early in a relationship are more likely to stay together. However, for the present work, we can only say that individuals looking back on dissolved, low-duration relationships report them as low in love, while those who are still in them report more intense feelings of love. Trust shows a slight increase overall for both intact and dissolved couples (the few data points for 3-5 year dissolved couples makes that mean value unreliable). Satisfaction is relatively stable both overall and for intact couples, but varies widely, rising and falling, for dissolved couples.

Survival Analysis

While the quality-over-time plots are indicative of general trends, they do not accurately reflect the outcome of all relationships. Many of the currently intact relationships in our sample will end after the completion of the study. That is, the eventual outcome for these relationships is unknown (or *censored*), and we should not assume that they will never end.

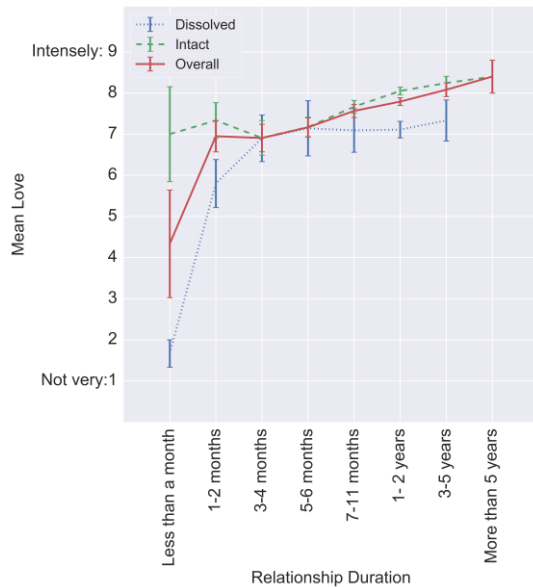


Figure 2: Mean intensity of love for individuals currently in an intact relationship, reporting a previous dissolved relationship, and overall. Error bars are ± 1 SE.

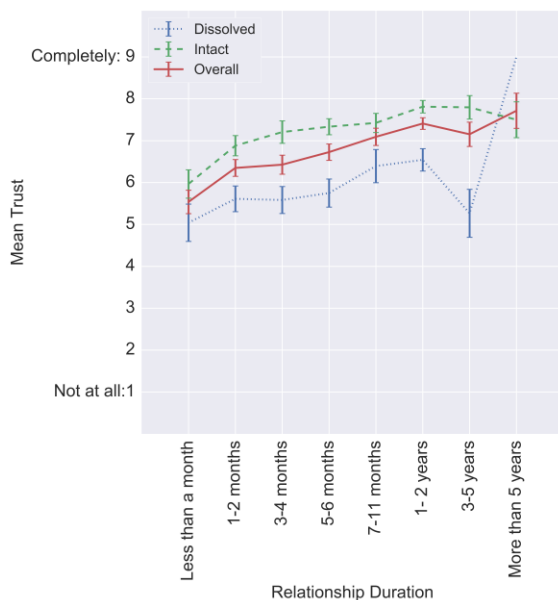


Figure 3: Mean intensity of trust for individuals currently in an intact relationship, reporting a previous dissolved relationship, and overall. Error bars are ± 1 SE.

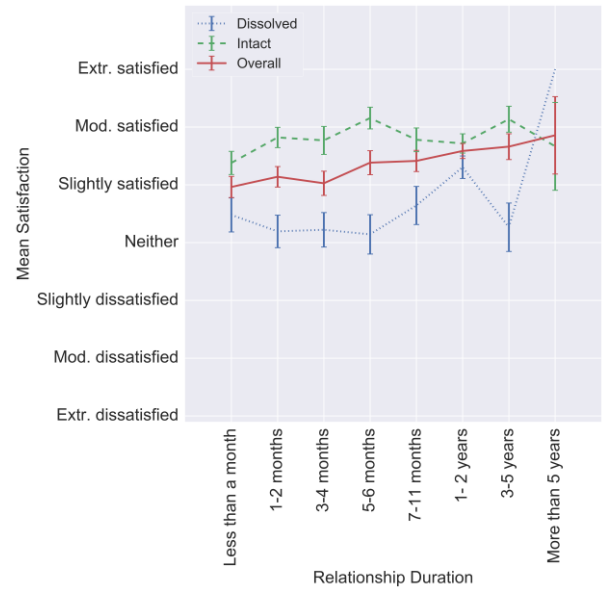


Figure 4: Mean intensity of satisfaction for individuals currently in an intact relationship, reporting a previous dissolved relationship, and overall. Error bars are ± 1 SE.

To more fully assess how each quality variable interacts with relationship duration while accounting for these possible eventual dissolutions, a survival analysis of relationship duration was run using the lifelines package in Python 3.5 (Davidson-Pilon, 2016). This analysis measures the connection of specified variables with the likelihood of relationship dissolution over time by estimating the number of relationships currently intact that will eventually dissolve at any particular duration. If a variable has no impact on relationship dissolution (and hence inversely duration), then it is not likely to be a resource that matters in terms of relationship foraging. However, if a resource increases or decreases the risk of dissolution (hence, a shorter or longer duration, respectively), it is something to be actively avoided or sought out, respectively, from the perspective of relationship foraging.

A Cox Proportional Hazard model of relationship duration (in months, available for $n=395$) was fit individually to satisfaction, trust, and love to determine how they affect the risk of dissolution. Dissolved relationships were coded as observed events, and non-numeric durations (e.g. “more than 24 months”) were excluded.

Table 1 shows the coefficients for each factor, which indicate the change each factor causes to the baseline hazard rate of dissolution based on length of the relationship alone. A positive coefficient indicates a heightened risk of dissolution relative to the baseline; a negative coefficient indicates a reduced risk of dissolution.

All three variables were significantly predictive of reduced risk of dissolution ($p<.001$), such that individuals reporting greater love, trust, or satisfaction would have longer relationships on average (with love having the

Table 1: Results of the Cox Proportional Hazards model, where the log of the coefficient indicates the proportional dissolution risk compared to the baseline hazard rate.

Variable	Events/Observations	Cox Coefficient (β)	e^β	p	95% CI
Love	73/221	-0.432	0.649	<.001	-0.649 to -0.216
Trust	184/395	-0.391	0.677	<.001	-0.512 to -0.270
Satisfaction	184/395	-0.285	0.752	<.001	-0.409 to -0.161

greatest impact and satisfaction the least). This is in line with our predictions and corroborates the patterns in Figures 2-4 while also considering possible eventual dissolutions beyond the durations in our data.

Discussion

Examining changes in relationship quality over time revealed that longer relationships had reliably elevated levels of love and trust (but not satisfaction), contrary to our predictions. Our findings of satisfaction stability across relationship lengths mirror those of Sprecher (1999), while our continual rise in trust and love is in line with Rusbult (1983)'s pattern of satisfaction increase.

As we expected, intact relationships showed significantly higher and more consistent rates of return in trust and satisfaction than dissolved relationships, in line with findings by Rusbult (1983). However, contrary to expectations, love was also higher in intact couples than dissolved couples. Sprecher (1994) previously found that love, but not satisfaction, generally remains high for dissolved couples, suggesting dissolution may be based on satisfaction alone. Results from our survival analysis showing that greater love was associated with lower likelihood of dissolution also countered Sprecher's finding. All three variables were thus higher in intact than dissolved relationships, and were predictive of dissolution. This suggests that these dyadic relationship factors may be used as criteria for choosing when to exit a relationship, or may co-vary with other factors predictive of dissolution.

The goal of this work was to examine whether particular aspects of relationship quality follow the time courses expected for depleting, or replenishing, or constant resource patches, to enable characterization of a relationship-foraging model (Cohen & Todd, 2017). The three qualities of love, trust, and satisfaction show rising levels over time on average for all relationships (intact and dissolved), suggesting that they are replenishing resources. It is important from a foraging perspective though to consider dissolved relationships separately, where a decision to leave the relationship-patch was made by at least one party; there love seems to plateau, suggesting a constant resource, while trust and satisfaction may actually decrease somewhat at the longest duration, suggesting depletion. Here more data is needed to better specify the form of these functions and what kind of patches they may conform to.

How might individuals use different aspects of quality to choose when to leave a relationship patch? If relationships

are like depleting patches, then OFT predicts that people will usually decide to leave and break up the relationship when its quality declines below the level they could expect to get elsewhere, without necessarily having any other relationship to move to. If relationships are like non-depleting sit-and-wait patches, then people would not be expected to leave while quality remains constant (or grows), but if they encounter another potential relationship of possibly higher value this could prompt a shift to that new patch, depending on switching costs. These strategies could make use of key cognitive comparison abilities.

First, while individuals would benefit from being able to accurately track their current relationship quality over time, previous work suggests that they may not be good at it (Sprecher, 1999). Regardless of the actual change in relationship quality, humans have a tendency to say that things have changed for the better. Individuals reporting annual current ratings of love and satisfaction for four years show very little significant differences between temporal samples, but report increases when asked how their feelings have changed over time (Sprecher, 1999). This suggests that individuals are not especially accurate at recalling past rates of return from a relationship, at least explicitly. However, given the relatively stability of quality after the first few months, individuals could conceivably hold a single average of quality and accurately characterize the overall quality of the relationship. Searchers are generally sensitive though to the rates of return from other possible relationships (interdependence theory; Thibaut & Kelley, 1959). That is, one's satisfaction with a relationship's quality can depend on comparison to the quality one could expect from currently available alternative mates (Rusbult, 1983; Simpson, 1987; Thibaut & Kelley, 1959). Thus we might expect relationship-leaving strategies to depend on comparison to other current possibilities or to averages of past experienced quality levels.

Second, by comparing the current relationship quality to a single previous average level or to the expected level of another currently possible relationship, individuals can use a simple aspiration value heuristic to assess the value of staying in their current relationship. Previous work in romantic partner choice shows individuals use aspiration-level heuristics when choosing to enter a new relationship based on the attractiveness of potential mates at speed-dating events (e.g. Beckage et al., 2009), so conceivably, this mechanism may apply to choosing to exit a relationship as well. The decision threshold could be based on the gap in

quality between successful and unsuccessful relationships over time. In our data, the size of this gap generally increased over time, which would predict continual dissolutions over time. Individuals may also consider the length of time spent below an aspiration value, given that a large gap between initial and long-term quality (for love, at least) is expected in all relationships in the early stages.

Relationships may be a different type of patch from just depleting or non-depleting: one where the quality level (return rate) increases the more the forager puts effort into it (up to a point). Moreover, the forager does not usually know how high the return rate will grow until they get there. (nor know how low the return may fall if it ever does start to decline). How should an individual decide whether to stay in such a situation? This may depend on how rapidly the rate of return is increasing or decreasing at particular stages of the relationship as a consequence of particular amounts of effort. New models will be needed to explore this, going beyond some of the strong simplifying assumptions made in existing models of non-depleting patch foraging. For instance, rather than having patches switch from being good to being bad instantaneously and searchers switch from not knowing anything about the return rate to knowing it precisely (Beachly et al., 1995), more realistic models for relationship foraging should include gradual change in rates of return and gradual learning of those rates.

A limitation of this work is that each relationship quality variable was measured at only one point, so intra-individual change in quality cannot be examined. Instead, we calculated the expected curves of returns over time using population averages. These patterns of change in quality do though mirror those from related longitudinal work. While not ideal, this replication provides some reassurance that using single observations per individual gives a relatively realistic representation, at least of the overall shapes of these curves, though future iterations of this model should use longitudinal data. Relatedly, there could have been systematic differences in ratings between those participants who were currently in relationships and so were asked to give current ratings, and participants who were not currently in relationships and so were asked to recall ratings from their earlier, now-dissolved relationship. For participants asked to recall their ratings of quality prior to their previously relationship's breakup, it is inevitable that this type of recall could skew ratings of quality, likely negatively. In addition, ratings could differ depending on who initiated dissolution. If the person did the breaking up, then they may rate their relationship quality as decreasing before the breakup; but if the person was on the receiving end, they may not rate quality as declining so much. Getting data from both parties in multiple relationships would help address this issue. We only asked for ratings of love from those participants who indicated they were in love, which may have skewed results positively (although they still showed a significant difference between intact and dissolved relationships). Finally, this work used a college sample, and the results may not generalize to the overall

population, especially given that most college students are not yet old enough to have had many long-term relationships.

Using a new framework, relationship-foraging modelling, and a technique that is relatively uncommon in cognitive science research, survival analysis, we found that some aspects of relationship quality may be considered depleting or replenishing resources from a foraging perspective, depending on how the relationship proceeds. Further research will explore whether thinking about relationships in terms of resource-filled patches that people can exploit and deplete or work to replenish themselves over time can help us understand how and when couples decide to stay or leave to forage for greener pastures.

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