Parents versus Peers: Assessing the Impact of Social Agents on Decision Making in Young
Adults

João F. Guassi Moreira, Sarah M. Tashjian, Adriana Galván & Jennifer A. Silvers*

Department of Psychology, University of California at Los Angeles, CA 90095

*corresponding author
Jennifer A. Silvers
Department of Psychology
1285 Franz Hall
Box 951563
Los Angeles CA, 90095-1563
310-794-4953
silvers@ucla.edu

Abstract

Young adulthood is a developmental phase where individuals must navigate a changing social milieu that involves considering how their decisions affect close others such as parents and peers. To date, no empirical work has directly evaluated how young adults weigh these relationships against one another. We conducted a pre-registered experiment where we pit outcomes for parents against outcomes for friends. Participants ($N = 174$, Ages 18-30) played two runs of the Columbia Card Task—one where gains benefited a parent and losses were incurred by a friend, and another where the opposite was true. We also tested whether age, relationship quality, and reward type earned for parents and friends (simulated v real) acted as moderating influences on parent-friend prioritization. Results showed individuals were more likely to make decisions that benefited a parent at the expense of a friend. Relationship quality and reward type moderated this effect whereas age did not.

Keywords: Development; Decision Making; Young Adulthood; Open Data; Preregistration

3 Trade-Offs in Other-Oriented Risk Taking

Parents versus Peers: Assessing the Impact of Social Agents on Decision Making in Young Adulthood

As social creatures, humans must often consider how their decisions will impact close others. While psychologists have typically studied this phenomenon by comparing decision making when it impacts a close other (e.g., parent, friend, or partner) versus when it does not, individuals in the real world often must make decisions that differentially impact multiple close others. The present study sought to model these trade-offs by pitting opposing outcomes for parents and friends to understand how individuals prioritize these close others when making decisions. We conducted this research in young adults because they still display peer-oriented characteristics of adolescence while being required to adapt to novel adult roles and situations (Arnett, 2014), making them an ideal population in which to study other-oriented decision making. In this pre-registered study, we tested whether young adults prioritize parents or friends during decision making. Because there exists considerable heterogeneity in behavior during the young adult years (Arnett, 2014), we also considered the role of key moderating factors such as age and relationship quality with parents and friends. Finally, to further examine boundary conditions on decision making, we explored whether young adults made different decision when presented with the chance to earn real versus simulated rewards for close others.

Young Adulthood is Marked by a Unique Social Ecology. Psychological science has attempted to characterize young adulthood for several decades (Gould, 1972; Levinson, 1986). Though debate exists on whether young adulthood is best defined as the half decade following adolescence, or a more protracted period occupying the entire third decade of life, most scholars generally agree that young adulthood is a unique transitory period unlike any other during the lifespan. During this period, individuals face newfound responsibilities and a shifting social milieu (Arnett, 2000, 2014). At the center of these changes lie the relationship dynamics between

4 Trade-Offs in Other-Oriented Risk Taking

young adults and their parents and peers. Young adults are similar to adolescents in that they remain highly oriented to peers but they are also often dependent on their parents in both the financial, emotional, and social domains (Arnett, 2000). Research to date points to young adulthood as a unique developmental phase during which both parents and peers play important roles.

Peers, especially friends, affect the way young adults construe their identities (Arnett, 2014; Hopmeyer & Medovoy, 2017; Roisman, Masten, Coatsworth, & Tellegen, 2004), construct appraisals (Knoll, Magis-Weinberg, Speekenbrink, & Blakemore, 2015; Welborn et al., 2015), and make decisions under uncertainty (Fromme, Corbin, & Kruse, 2008; Hopmeyer & Medovoy, 2017; Ohannessian, Vannucci, Flannery, & Khan, 2017; Riedijk & Harakeh, 2017; Silva et al., 2016; White et al., 2006). Despite the seemingly monolithic importance of friends, parents also remain important in the lives of their young adult offspring. Like friends, parents also impact how young adults engage in real world risk taking behaviors and make decisions (Abaied & Emond, 2013; Carlson, 2014; Guassi Moreira & Telzer, 2018), refine existing identities (Kaniušonytė & Žukauskienė, 2018), and maintain mental wellbeing (Guassi Moreira & Telzer, 2015; Lucas-Thompson, 2014; Needham, 2008).

In fact, as individuals transition from adolescence to young adulthood, parents appear to become more, rather than less, central in their lives. Relative to adolescents, young adults report higher levels of cohesiveness and obligation towards parents (Tsai, Telzer, & Fuligni, 2013; Whiteman, McHale, & Crouter, 2011) while becoming increasingly receptive to their advice (Carlson, 2014), perhaps in part because young adulthood is a time of high ‘turnover’ among friendships (Arnett, 2000). In other words, parent-child relationships can be an important source of stability for young adults during a time of social instability. Together, these pieces of evidence

5 Trade-Offs in Other-Oriented Risk Taking

demonstrate that *both* parents and peers play crucial roles in the lives of young adults but it is unknown how young adults prioritize these two important relationships.

The Moderating Roles of Age and Relationship Quality. Since evidence suggests that age and relationship quality influence the extent to which young adults value their parents and friends, it follows that these variables likely moderate decision making about parents and friends. With regards to age, we anticipated that older individuals would be more likely to favor parents over friends. This prediction was informed by findings that show parent-child relationship quality increases throughout young adulthood (Tsai et al., 2013) and that young adults experience high friendship ‘turnover’ (Arnett, 2000, 2014), which may cause them to weigh parent relationships more heavily during this developmental phase. With regard to relationship quality, we predicted that participants who reported better relationship quality with parents would weigh parents more heavily than those with worse relationship quality and that the same would be true for friendship quality. Close relationships in young adulthood are rich with heterogeneity and the quality of such relationships has been shown to affect other types of decision making (Guassi Moreira & Telzer, 2018).

Boundary Conditions of Reward Type on Decision Making. Extant evidence indicates that simulated and real rewards can differentially influence decision making. While reward type has not been examined in the context of other-oriented decision making, it is possible that reward type influences other-oriented decisions just as it does for self-oriented decision making. Scenarios with real rewards—compared to simulated ones—recruit different neural systems (Bray, Shimojo, & O’Doherty, 2010; Kang, Rangel, Camus, & Camerer, 2011; Miyapuram, Tobler, Gregorios-Pippas, & Schultz, 2012; Scholl et al., 2015) and elicit different patterns of decision making behavior (Hinvest & Anderson, 2010). Although some research suggests

6 Trade-Offs in Other-Oriented Risk Taking

simulated and real rewards are equivalent (Locey et al., 2011; Madden et al., 2003), these studies have largely been conducted on a narrow set of economic tasks and in largely asocial contexts. Studies that use different tasks or vary the social implications of decisions find that real and simulated scenarios bias decision-making in different ways (FeldmanHall et al., 2012a, 2012b; Pronin et al., 2007). Though we had no directional hypotheses about how real versus simulated rewards might influence decisions in the current study, the prior literature suggests this is nevertheless an important variable to consider.

Current Study. We investigated how young adults made decisions that had opposing consequences for a parent versus a friend. Across two samples, as part of a pre-registered study, participants played one round of a decision-making task in which they chose between making a decision that benefited their parent while risking a loss for their friend or avoiding a loss for their friend while forgoing a benefit for their parent. The opposite was true for a second round (counterbalanced order). This manipulation is well-suited to address how individuals make decisions about parents versus friends because (i) it directly pits parents and friends against one another, modeling real-world dilemmas, (ii) these types of decisions involving risk are highly salient to young adults (Duell et al., 2017), and (iii) most importantly, in everyday life, decisions containing elements of risk tend to be highly consequential. In addition to measuring age and relationship quality to test for moderating influences, we also sought to better understand the generalizability of any observed effect. To this end, we manipulated the reward types that participants could gain for parents and friends (i.e., simulated versus real rewards).

Methods

Experiment Overview. Our aforementioned research questions were investigated in an experiment conducted across two samples. Although both samples were pre-registered as

independent studies, we are reporting them in one pooled, aggregate sample here for clarity and ease of interpretability. These two samples differed primarily based on the type of reward that could be won for parents and peers (simulated vs real). Our primary hypotheses and analyses did not differ between studies and sample-specific results can be accessed in the Supplemental Material.

We used a novel variant of the Columbia Card Task to probe whether young adults exhibited a preference when making decisions that had opposing consequences for a parent and a friend. Our key aims were to test whether participants would prioritize parents or friends (Hypothesis 1). Our secondary aims were to test whether individual differences of age (Hypothesis 2) and relationship quality (Hypothesis 3), in addition to reward type (Exploratory Research Question 1), moderated the extent to which individuals prioritized parents or peers during decision making. We also administered a supplemental experimental task to determine how the effects here might generalize to other forms of decision making (e.g., certain decisions). Though the certain-decision task results are beyond the scope of our primary research questions, we report them in the Supplementary Material and reference them briefly in the results.

Hypotheses. Our *a priori* hypotheses and exploratory research questions, listed below, were pre-registered on the Open Science Framework (OSF) prior to data collection (osf.io/5tm48).

Primary hypothesis.

Hypothesis 1: There is ample evidence to suggest that parents and peers each play crucial roles in the social ecology of young adulthood. However, prior work has not tested whether parents or peers are more influential than the other in shaping decision making for young adults. If parents are more central than peers, participants would be more inclined to make decisions that benefit a parent at the expense of a peer. However, if peers are more important than parents, then

8 Trade-Offs in Other-Oriented Risk Taking

individuals would be more likely to make decisions that benefit a peer at the expense of a parent. We note here that because extant evidence highlights how both parents *and* peers exert strong pulls over behavior, it is appropriate to formulate a competing hypothesis such as this one. This hypothesis was pre-registered *a priori*.

Secondary Hypotheses

Hypothesis 2: Since existing literature suggests closeness and identity with parents increases during late adolescence and young adulthood (Tsai et al., 2013), we hypothesized that older participants, compared to younger participants, would be more likely to make decisions that would benefit a parent at the expense of a friend.

Hypothesis 3: We hypothesized that participants with better relationship quality with their parent would be more likely to make decisions that benefit that parent at the expense of a friend (moderation). Similarly, we hypothesized that participants with greater relationship quality with their friend would be more likely to make decisions that benefit that friend at the expense of a parent (moderation). This hypothesis was pre-registered as an exploratory analysis in our first sample and as a hypothesis in the second sample.

Exploratory Research Question 1: Prior work has demonstrated that reward type (real v simulated) can potentially affect decision making behavior. Here, we examined whether young adults prioritized parents and peers differently in conditions of real and simulated rewards for parents and friends. This manipulation was specified *a priori*, but directional hypotheses about it were not.

Lastly, in an effort to understand potential motivations for parent-peer prioritization during decision making, we also tested a supplemental hypothesis related to perceived levels of obligation towards family and friends. For purposes of brevity and clarity, it, along with its

accompanying analyses, is described in the supplementary material. Hypotheses regarding both relationship quality and obligation were registered as exploratory research questions for one sample (osf.io/5tm48) and hypotheses for another (osf.io/4pvxb).

Methods

Participants. Participants were young adults belonging to two samples recruited from the West Los Angeles area in the United States. Prior to data collection, we set each of the two sample sizes at 90 participants in order to be comparable to, or larger than, other similar studies (Botdorf, Rosenbaum, Patrianakos, Steinberg, & Chein, 2016; Van Hoorn, Crone, & Van Leijenhorst, 2017). In the first sample, parents and friends were compensated with simulated rewards, whereas in the second sample parents and friends were compensated with real rewards (more information below). Participants in sample 1 were recruited from the psychology subject pool at UCLA and were compensated with course credit while participants in sample 2 were compensated with \$20. The combined sample included 174 young adults ($M_{age} = 20.72$ years, $SD = 2.16$, Range = 18.06 – 30.81; 54 male). With respect to race, 48% of participants identified as Asian, 29% identified as Caucasian, 2% identified as African American, 6% identified as mixed race, 1% identified as American Indian/Alaskan Native, and 10% identified as ‘other.’ The remaining participants (4%) declined to report their race. Ethnically, 18% of participants identified as Hispanic/Latinx. 92% of participants were enrolled in classes at UCLA. Six participants were excluded from analyses. Two participants were excluded due to pre-specified exclusion criteria (non-compliance with experimenter instructions), two were excluded due to technical errors preventing acquisition of data, and two other participants had no response variability in their decisions across both runs of the task, rendering their data inappropriate for statistical modeling. All participants provided written consent in accordance with policies of the

UCLA Institutional Review Board. All data and materials are publicly available on the OSF (osf.io/rq96w).

Experimental Protocol.

The following protocol was employed in both samples. The only difference between the two was the type of compensation for each participant's parent and friend (i.e., real or simulated; addressed thoroughly below).

Parent and Friend Nomination and Salience Manipulation. Prior to completing the experiment, participants were asked to nominate a parent and close friend for the study. Participants were told they could choose any parent and any friend they wished. Afterward, in order to increase the salience of the chosen parent and friend in a participant's mind, participants listed basic information about their nominated parent and friend (e.g., name, age, sex, etc.), a memory with each person, and words and phrases describing each person.

Parent and Friend Relationship Quality. Following parent and friend nominations, relationship quality with each individual was assessed using the Inventory of Parent and Peer Attachment (IPPA; Armsden & Greenberg, 1987). The IPPA has been frequently used as a metric of subjective relationship quality (Branje, Hale, Frijns, & Meeus, 2010; Fanti, Henrich, Brookmeyer, & Kuperminc, 2008) and was initially developed for use in young adult populations. Participants used a five-point scale (1 = "Almost never or never" to 5 = "Almost always or always") to answer 28 items about their relationship quality with their parent and 25 items about their relationship quality with their friend. Sample item for parent relationship quality: "My parent respects my feelings". Sample item for friend relationship quality: "When we discuss things, my friend considers my point of view". Responses were reverse-scored where appropriate and averaged to yield a single mean score for both parent relationship quality and

11 Trade-Offs in Other-Oriented Risk Taking

friend relationship quality (Sample 1: Parent $\alpha = .94$; Friend $\alpha = .91$; Sample 2: Parent $\alpha = .95$; Friend $\alpha = .90$). A self-report measure assessing self-reported perceived obligation to parents and friends was also collected in Sample 2 (real rewards) and is discussed in the supplement.

Additional self-report measures assessing other constructs such as sensation seeking and real-word risk-taking (listed in the Supplementary Materials) were also collected but not analyzed.

Decision-Making Task. We used a modified version of the “hot” Columbia Card Task to assess how participants weighed parents and friends during decision making (CCT; Figner, Mackinlay, Wilkening, & Weber, 2009). The “hot” CCT is a widely used experimental paradigm that measures risky decision making in an incremental, step-wise fashion. During the experimental session, participants performed two runs of the CCT (1 run = 24 game rounds, 3 repetitions of each deck type). During each round, participants were shown 16 overturned cards and were told that they could win points by turning over gain cards or lose points by turning over a loss card (Figure 1). Above the set of cards was a header that contained information about (i) the total number of loss cards (either 1 or 2) in the deck, (ii) the point value (either -30 or -60) of each loss card, (iii) the point value (either 10 or 20) of each gain card, (iv) and a running total tracking the points they earned for that deck. The different possibilities in the number of loss cards, point value of loss cards, and point value of gain cards yielded 8 total distinct types of game rounds. At the bottom of the screen, participants were reminded of the CCT condition (e.g., ‘Parent Gain | Friend Lose’; ‘Parent Lose | Friend Gain’).

12 Trade-Offs in Other-Oriented Risk Taking

Figure 1. An example round of the Columbia Card Task (CCT). Here the participant is shown winning 20 points for their parent at the expense of a friend.

Each round began with a score of 0 and all the cards face down. Participants were required to choose between turning over a card (risky choice) or not turning over a card (“passing”; safe choice). Choosing to pass meant that a participant was finished with the round; they would not lose any points for that round but could not gain any additional points. If a participant chose to turn over a card, the computer selected a card and flipped it over. Although participants were informed the computer selected a card at random, the first three risky choices a participant made were ‘rigged’ so as to always yield a gain card. This was done in order to ensure that participants would not turn over loss cards too early in a given round and feel disproportionately discouraged from flipping cards (McCormick & Telzer, 2017). A game round continued until participants decided to pass to the next round, or until they flipped over a loss

13 Trade-Offs in Other-Oriented Risk Taking

card. The task was self-paced and programmed in PsychoPy (version 1.82.01; Peirce, 2007).

Prior to beginning the experimental task, participants completed four practice rounds of the CCT in order to ensure they properly understood the task.

We used a novel variant of the CCT to assess how young adults prioritized parents versus friends when making decisions. During one run of the task, participants were told all the points associated with gain cards would be gained for their parent, whereas all the losses from a loss card would be incurred by their friend. During another run of the task, participants were told the opposite was true: all the points associated with gain cards would be gained for their friend, whereas all the losses from a loss card would be incurred by their parent. The run order between these two conditions was counterbalanced. The manipulation modeled real world trade-offs in decision making by assessing how individuals make decisions that stand to benefit one close other at the risk of harming a second close other. That is, each decision was *always* associated with a gain for one close other at the potential expense of another close other—there were no trials in which only one close other was affected and the other was not. For example, during the parent-gain/friend-lose run, turning over a card allowed participants to gain points for their parent at the potential expense of their friend. Alternatively, if they chose to pass, participants were guaranteed to avoid a loss for their friend but gave up the chance to obtain a gain for their parent. This manipulation ensured there would always be a tradeoff for prioritizing one close other over the other.

Manipulating Reward Type: Real vs Simulated Rewards. We manipulated reward type to assess its impact on other-oriented decision making in young adults. In *sample 1*, participants were told to play as if the points could be redeemed for a tangible good or service but were notified that their parent or friend would not actually receive any such rewards. Specifically,

14 Trade-Offs in Other-Oriented Risk Taking

participants were asked to imagine that the points won for their parent and friend respectively during the task could be used to benefit them in some material way. For this reason, rewards are said to be simulated.

In *sample 2*, participants began the experiment with a \$5 endowment for both their parent and friend and were told that their task decisions would result in them gaining or losing actual money for their close others. Thus, the rewards for parents and friends were *real* and outcomes were received immediately. The following refers to only the participants in sample 2. To keep the task in sample 2 (real) as consistent with sample 1, participants from the former were told that their decisions would also earn or lose points for their parent and friend, but that the outcome for one deck from each run of the task would be chosen at random, converted to dollars, and then added to or subtracted from the initial endowments. Participants were told that 10 points were equivalent to \$1 (USD). In order to ensure participants believed the rewards in the concrete condition were not fixed, we told participants a computer script would be run immediately following the session to determine the amount won/lost for parents and friends. A dummy script was run after the session run to give the appearance that actual calculations were being made. After the session, participants were told they had won an additional \$2 for their friend and an additional \$1 for their parent. Unbeknownst to participants, these values were fixed. Participants in the real rewards sample were shown envelopes for each close other with the \$5 endowment prior to playing the CCT. These envelopes were addressed with addresses provided by the participants for their parent and friend, respectively, and the earnings were mailed following the session. These participants were debriefed as to the fixed reward amounts after the session.

Analytic Approach & Decision-Making Model. Because different facets of risky scenarios tend to exert unique influences on decision making (van Duijvenvoorde et al., 2015), it can be

15 Trade-Offs in Other-Oriented Risk Taking

advantageous to operationalize and model the different components of a risky scenario (Richards et al., 2013). One such technique, known as a risk-return decomposition, involves explicitly partitioning risky scenarios into components of true reward and true risk (van Duijvenvoorde, Blankenstein, Crone, & Figner, 2017). We conducted a risk-return decomposition to dissociate the effect of Return (i.e., earnings) and the effect of Risk (i.e., outcome variability) on our participants decision making. By running a risk-return decomposition, we were able to test how participants use information about Risk and Return distinct from who stands to gain or lose (Condition¹: parent or peer) when making decisions.

Consistent with recent work (van Duijvenvoorde et al., 2015), Return was operationalized as the expected value (EV) of a given decision:

$$EV = (\text{gain probability} \times \text{gain amount}) + (\text{loss probability} \times \text{loss amount})$$

Risk was operationalized as the standard deviation (SD) of the possible outcomes associated with a given decision:

$$SD = \sqrt{(\text{gain probability} \times (\text{gain amount} - EV)^2 + \text{loss probability} \times (\text{loss amount} - EV)^2)}$$

Because the decision to pass did not result in the addition or loss of points, the SD and EV for choosing to pass were both zero. Based on the combination of parameters for each possible game

¹ This was initially termed as ‘Context’ in our pre-registration document but has since been changed to ‘Condition’ for clarity.

16 Trade-Offs in Other-Oriented Risk Taking

round (number of loss cards, value of loss cards, value of gain cards), the SD values ranged from 9.68 to 40² and EV ranged from -37.67 to 16.88.

Within-person models. We sought to understand the extent to which our experimental condition manipulation (whether a parent stood to gain and a friend to lose, or vice versa) influenced participant's decisions while controlling for other salient features of a given decision (i.e., Risk and Return). Data were analyzed using a multi-level model because our data consisted of repeated measures (decisions) nested within individuals. Hierarchical Linear Modeling was used for data analysis (HLM for Windows, version 6.06; Raudenbush, 2004; Raudenbush & Byrk, 2002). Decisions (1=turn over card, 0=pass) for the i th participant (i) at the t th trial (t) were modeled as a function of an intercept (π_{0i}), the Condition (π_{1i}) (1 = parent gain/friend lose, 0 = friend gain/parent lose), Return (π_{2i} ; EV) and Risk (π_{3i} ; SD). To this end, we estimated the following equation:

Level 1 (within-participant):

$$(1) \quad \text{Logit}(\text{Decision}_{it}) = \pi_{0i} + \pi_{1i}(\text{Condition}) + \pi_{2i}(\text{Return}) + \pi_{3i}(\text{Risk}) + \varepsilon_{it}$$

Between-person models. Additional HLM models were analyzed to test whether the effects of Condition, Return, and Risk on decision making varied with age, relationship quality, and reward type (simulated vs real). Because there are consistent differences in both decision making and parent-peer relationship dynamics for males and females (Guassi Moreira & Telzer, 2015; Mahalik et al., 2013; Telzer & Fuligni, 2013), we also included sex as a covariate. As specified in our pre-registration document, the Level 1 model was first run with no predictors

² Technically, zero was the lowest value Risk SD one could take, provided one has flipped all of a given deck's gain cards and only loss cards remain. However, because this event was probabilistically unlikely, we included the next lowest possible value to give a more realistic range of what our participants encountered. Similarly, the lowest possible minimum for EV was -60, but the lowest the participants actually encountered is what is listed in the text.

entered at Level 2. Next, age and sex were entered as the first level 2 predictors. Afterwards, we included relationship quality (parent and friend) and reward type. This means three models were run: (i) a model with no between-participant predictors (i.e., no Level 2 predictors); (ii) a model that only contained age and sex as between-participant predictors; (iii) a full model that included the aforementioned variables in addition to relationship quality and reward type. The final set of Level 2 equations are printed below.

Level 2 (between-participants):

$$(2) \quad \pi_{0i}(\text{intercept}) = \gamma_{00} + \gamma_{01}(\text{Age}) + \gamma_{02}(\text{Sex}) + \gamma_{03}(\text{PRQ}) + \gamma_{04}(\text{FRQ}) + \gamma_{05}(\text{RT}) + u_{0i}$$

$$(3) \quad \pi_{1i}(\text{Condition}) = \gamma_{10} + \gamma_{11}(\text{Age}) + \gamma_{12}(\text{Sex}) + \gamma_{13}(\text{PRQ}) + \gamma_{14}(\text{FRQ}) + \gamma_{15}(\text{RT}) + u_{1i}$$

$$(4) \quad \pi_{2i}(\text{Return}) = \gamma_{20} + \gamma_{21}(\text{Age}) + \gamma_{22}(\text{Sex}) + \gamma_{23}(\text{PRQ}) + \gamma_{24}(\text{FRQ}) + \gamma_{25}(\text{RT}) + u_{2i}$$

$$(5) \quad \pi_{3i}(\text{Risk}) = \gamma_{30} + \gamma_{31}(\text{Age}) + \gamma_{32}(\text{Sex}) + \gamma_{33}(\text{PRQ}) + \gamma_{34}(\text{FRQ}) + \gamma_{35}(\text{RT}) + u_{3i}$$

The intercept (π_{0i}) and trial-by-trial associations between Condition (π_{1i}), Return (π_{2i}), and Risk (π_{3i}) represent participant-specific parameters that were allowed to vary randomly across participants. Each were modeled as fixed effects in addition to cross-level interactions with age (continuous), sex (binary), parent relationship quality (PRQ; continuous), friend relationship quality (FRQ; continuous), and reward type (RT; simulated vs real; binary) (e.g., the γ_j -s). Age and relationship quality variables were centered using the grand mean. Sex and reward type were dummy coded (0 = male, 1 = female; 0 = simulated, 1 = real). The u_j -s represent random error terms that were allowed to vary between participants. That is, they are the error terms in predicting each participant's level 1 coefficients from a constant and effects of age, sex, relationship quality, and reward type. Fixed effects are averaged across values of the u_j -s. Additional supplemental models with parent/friend obligation were run by swapping out

measures of relationship quality for measures of parent/friend obligation (see Supplemental Materials for more information about the measure).

Results

Confirmatory and exploratory results are reported across the entire set of participants (e.g., in the aggregate sample). Results split by sample are reported in Supplementary Materials. Multilevel model statistics are reported in Tables 1 and 2 unless explicitly noted in text. Non-multilevel tests (e.g., t-tests) are reported in text.

Decision making as a function of Condition.

First, we examined the Level 1 model described in Equation 1 to test whether decision making varied as a function of Condition. As shown in Table 1, we found significant associations between decision making and all three predictor variables: Condition (i.e., who gains/loses as a result of the decision), Return (EV), and Risk (SD). Participants were more likely to turn over a card when their parent stood to benefit at the expense of their friend. Consistent with prior work (e.g., van Duijvenvoorde et al., 2015), participants were more likely to turn over a card if Return values were high and if Risk values were low. Importantly, this effect remained significant (or marginally significant) when adding sex, age, reward type, and parent/friend relationship quality terms to the model (see Table 2 below).

Table 1. Trial-by-trial association between risky decision making and Condition, Return and Risk

Predictor	γ	<i>SE</i>	<i>p</i>
Intercept	2.585	.043	<.001
Condition	0.119	.028	<.001
Return	0.046	.003	<.001
Risk	-0.055	.002	<.001

Note. Condition was coded such that a 0 = friend gain/parent lose, 1 = parent gain/friend lose. Return (EV) ranged from -60 to 16.88 and SD ranged from 9.68 to 40. γ -s represent expected change in log odds. Robust standard errors are reported from a population-average model.

Age and relationship quality as moderators of decision making.

Age. Next, we examined the Level 2 models described in equations 2-5 to test whether the trial-by-trial associations between Condition and decision making differed as a function of age, relationship quality with parents and friends, while controlling for sex and reward type. As our modeling procedures noted earlier, we first added age and sex to Level 2 of our multilevel model (Table 2, Panel A). Next, we added parent and friend relationship quality in addition to reward type (Table 2, Panel B). As shown in Table 2 (Panel A), age moderated the trial-level association between decision making and Condition, such that older individuals were more likely to favor their *friends*, instead of parents, contrary to what we expected in Hypothesis 2. Age did not interact with either Return or Risk. Despite the significant effect of age in the first model, it was no longer significant when adding the other moderating terms to the model (Table 2, Panel B). Thus, we caution against strong interpretation of age effects and ultimately consider them to be inconclusive. These analyses were confirmatory, as opposed to exploratory, because they were testing an *a priori* hypothesis (Hypothesis 2).

Table 2. Trial-by-trial association between risky decision making and Condition, Return and Risk with level two moderators. Panel A lists the results of HLM models to test Hypothesis 2. Panel B lists analyses of additional models to test Hypothesis 3.

Predictor	A			B		
	γ	<i>SE</i>	<i>p</i>	γ	<i>SE</i>	<i>p</i>
Intercept						
Intercept	2.496	.092	<.001	2.416	.100	<.001
Sex	0.130	.108	.229	0.130	.108	.233
Age	-0.001	.020	.949	-0.013	.020	.536
Parent RQ	-	-	-	-0.294	.057	<.001
Friend RQ	-	-	-	0.321	.081	<.001
Reward Type	-	-	-	0.215	.086	.014
Condition						
Intercept	0.112	.067	.098	0.225	.063	.001
Sex	0.015	.076	.844	0.034	.070	.624
Age	-0.023	.012	.049	-0.006	.011	.599
Parent RQ	-	-	-	0.181	.044	<.001
Friend RQ	-	-	-	-0.297	.062	<.001
Reward Type	-	-	-	-0.283	.053	<.001
Return						
Intercept	0.070	.006	<.001	0.057	.005	<.001
Sex	-0.034	.006	<.001	-0.031	.006	<.001
Age	-0.002	.001	.155	-0.003	.001	.011
Parent RQ	-	-	-	0.000	.003	.922
Friend RQ	-	-	-	-0.011	.005	.025
Reward Type	-	-	-	0.024	.005	<.001
Risk						
Intercept	-0.058	.004	<.001	-0.051	.004	<.001
Sex	0.004	.004	.371	0.003	.004	.531
Age	0.000	.001	.825	0.001	.001	.523
Parent RQ	-	-	-	0.005	.002	.029
Friend RQ	-	-	-	-0.003	.004	.455
Reward Type	-	-	-	-0.014	.004	<.001

Note. Sex was coded Male=0, Female = 1. Condition was coded such that a 0 = friend gain/parent lose, 1 = parent gain/friend lose. Return (EV) ranged from -60 to 16.88 and SD ranged from 9.68 to 40. RQ stands for 'relationship quality'. Reward Type was coded 0 = simulated, 1 = real. γ -s represent expected change in log odds. Robust standard errors are reported from a population-average model. Hypothesis 2 predicted age effects such that individuals would be more likely to prioritize parents over peers with age. Hypothesis 3 posited that reporting greater parent and friend relationship quality, respectively, would be associated with more likely parent and friend prioritization, respectively.

Relationship Quality. We found that both parent and friend relationship quality significantly moderated the effect of Condition on decision making (Table 2, Panel B). Specifically, the continuous measures of parent and friend relationship quality entered at Level 2 moderated Level 1 associations. To follow-up and unpack these interactions, we first conducted a paired-samples t-test to compare relationship quality for parents and friends. Although parent and friend relationship quality were correlated ($r = .229, p = .002$), participants reported greater levels of relationship quality with their friend, compared to their parent (Parent mean = 3.72, Friend mean = 4.21, $t(173) = -8.90, p < .001$). Even though participants reported higher quality relationships with a close friend, they were still overall more likely to make choices that benefited a parent at the expense of their friend. These were pre-planned exploratory analyses for our first sample and confirmatory analyses for the second sample.

To further probe the interactions, we tested the highest ($n = 55$; Mean = 4.40) and lowest ($n = 58$; Mean = 2.97) thirds of our sample in terms of parent relationship quality and re-ran the full model (excluding parent relationship quality scores from level 2) in these subsets. Results showed that individuals reporting the highest parent relationship quality had a positive association between Condition and decision making ($\gamma = .424, SE = .125, p = .002$), whereas those with the lowest parent relationship quality did not show a significant relationship between Condition and decision making ($\gamma = -.035, SE = .113, p > .250$). These results suggest that those with relatively higher parent relationship quality were more likely to prioritize their parents compared to friends when making decisions. We used the same process to interrogate the friend relationship quality interactions: We conducted a separate analysis in which we split the sample into groups based on the highest ($n = 54$; Mean = 4.68) and lowest ($n = 61$; Mean = 3.70) thirds of friend relationship quality and re-ran the full model, excluding friend relationship quality from

the model. A trend similar to the parent relationship quality results emerged. Individuals with the highest friend relationship quality were likely to prioritize neither parents or friends, whereas those with the lowest friend relationship quality prioritized parents over friends (High: $\gamma = .157$, $SE = .180$, $p > .250$; Low: $\gamma = .251$, $SE = .108$, $p = .023$). Relatively speaking, these results show those with high friendship relationship quality tend to prioritize friends more than parents, compared to those with low friend relationship quality.

To determine whether another measure of relationship quality would yield similar results, we examined the valence of the words and phrases that participants used to describe their parents and friends during the salience manipulation as an “implicit” measure of relationship quality (see Supplemental Materials for more details). These adjectives were rated with a sample of participants via Amazon’s Mechanical Turk and the resulting valence ratings were entered into our Level 2 equations in place of self-report measures of relationship quality and yielded very similar results (See Supplemental Materials).

Reward type affects parent-peer prioritization. Interestingly, reward type significantly moderated other-oriented decision making (Table 2, Panel B) such that participants were more likely to favor their parents at the expense of their friends when rewards were simulated (fixed effect of Condition from abstract reward sample: $\gamma = 0.219$, $SE = .035$, $p < .001$). By contrast, when rewards for close others were real, the fixed effect of Condition was not significantly different from zero ($\gamma = 0.019$, $SE = .041$, $p > .250$), meaning that participants did not favor parents or friends over the other (Figure 2). Reward type moderated several other aspects of decision making. For example, individuals were more likely to flip a card at higher EV values when rewards were real (i.e., interacted with Return), and to flip a card at lower SD values when rewards were real rather than simulated (i.e., interacted with Risk).

Searching for motivational causes. Post-hoc (i.e., not preregistered) analyses were conducted to infer what motivated participants to, on average, weigh parents more heavily than friends. Most notably, we tested whether the effects of return and risk differentially affected decision-making behavior across our two experimental conditions. To this end, we created Condition X Return and Condition X Risk interaction terms by multiplying Condition with Reward and Risk respectively. These were entered into the first level of the model described in the prior section (i.e., equations 1-5; all Level 2 variables from the final model were also included). These interaction terms did not yield significant results, implying that Return and Risk did not motivate individuals differentially across conditions. Additional, results testing the effect of perceived obligation to parents and friends on our rewards are detailed in the Supplemental Materials. The results of said analyses were inconclusive.

Figure 2. The likelihood of turning over a card (“risky” choice) broken down by Reward Type (i.e., simulated, real). A greater value on the y-axis indicates a greater likelihood of turning over a card.

Note. Condition refers to whether participants’ decisions benefitted a friend at the potential expense of parent or vice versa. Type refers to reward type. Likelihood refers to log odds (logits) of flipping over a card. Values reflect fixed effect coefficients obtained from running separate models split by reward type.

Discussion

Young adulthood is a transitional phase of development in which individuals juggle new roles and encounter novel scenarios while trying to adapt to an evolving social landscape. To date, no prior studies had investigated how young adults make decisions that entail opposing outcomes for close others. In the present study, we found evidence suggesting young adults are overall more likely to prioritize parents over a close friend. Self-reported relationship quality

affected the extent to which individuals prioritized parents and friends, as higher relationship quality with a particular close other was associated with prioritizing that close other during decision making. Lastly, we found that young adults appear to show no preference between parents and friends (i.e., equal prioritization) when rewards are real, compared to simulated. Together, these results suggest that parents play a significant role in the lives of young adults, helping clarify the *whom* and the *when* of other-oriented decision-making in young adults.

Overall, young adults in our sample were more likely to make decisions during the CCT that benefitted their parents at the expense of their friend. This was the case despite the fact that participants reported significantly greater levels of self-reported relationship quality with friends compared to parents. Bucking popular lay theories of young adulthood (Arnett, 2000), this result is consistent with recent work showing that individuals begin to identify more with their parents and report better cohesion with them during the transition to young adulthood (Tsai et al., 2013). Our findings expand upon this work by suggesting parent relationships are so important that young adults are willing to incur losses for their friends in order to benefit their parents. One explanation for this is that parent relationships embody stability at a time in the lifespan when it is difficult to obtain (Arnett, 2014). Another explanation is that participants' tendency to prioritize parents over peers was due to differences in perceived obligation, defined as feeling as though one ought to support, assist and respect the wishes of close others (Fuligni & Pedersen, 2002). Simply put, parents typically invest more emotionally and financially into their children than friends do into their peers. Recognizing this, young adults may feel indebted to their parents and subsequently desire to help them more than friends. Though supplemental analyses did not find evidence for this explanation, it nevertheless merits consideration in future studies. These

findings will aid subsequent investigations of *whom* young adults prioritize and may eventually inform work focused on understanding *why*.

Relationship quality was a key moderating influence on how young adults prioritized parents and peers during the task. These results are noteworthy because they highlight that the extent to which one may favor a parent or friend is limited by the nature of their relationships. For instance, one may realize that their friend could benefit more from money than a parent, but if they do not like their friend very much (relatively speaking), they will not prioritize them during decision making. These results contribute to a broader, increasingly recognized trend in psychological science that underscores how social decision-making across development is modulated by a myriad of additional social variables whose moderating interactions are almost as important as the main effects themselves (e.g., Guassi Moreira & Telzer, 2017).

Surprisingly, we did not find strong evidence to support our hypothesis that older participants weigh their parents more heavily than younger ones. This finding warrants at least two potential explanations. The first is methodological—it may be that to properly observe such an effect, we would need a broader age range that included adolescents, as has been used in prior studies finding significant age differences on related phenomena (Braams & Crone, 2016; Steinberg et al., 2008; van Duijvenvoorde et al., 2015). The other explanation is that this is a true null finding and that across age, individuals prioritize their parents over their friends when making decisions that affect both.

One of the most intriguing findings in our study was that the type of rewards participants could gain for their parents and friends (simulated vs real) affected their prioritization of these close others during decision making. Earning simulated rewards for a parent and friend was related to greater parent-over-friend prioritization during the CCT. By contrast, earning real

rewards was tied to showing neither a preference for parents or friends. Simulated rewards could result in individuals pursuing idealized representations of goal structures—or, the intrinsic arrangement of how various goals are prioritized arranged in relation to one another; real rewards force individuals to modulate their goal structures according to reality's demands (Freitas, Gollwitzer, & Trope, 2004). It follows that the young adults in the simulated rewards condition could have been making decisions according to an ideal goal structure in which their parents were more important than friends. After all, prioritizing a parent is easier when one's friends do not actually incur any losses. However, once rewards become real, young adults were forced to face the reality that losses were no longer immaterial and may have had difficulty making decisions that rigidly favored an ideal goal structure. Alternatively, it is possible that earning real rewards elicited greater emotional salience, perhaps causing individuals to behave more impulsively and discount long-term goals in favor of short-term ones (Freitas, Gollwitzer, & Trope, 2004)

Additional research is needed to address the limitations of the current study. First, future work should explicitly examine whether financial obligations moderate the extent to which individuals in this age range prioritize parents versus peers. Second, this study tested one class of rewards and losses and it is presently unknown whether these results would generalize to other kinds of reward (e.g., social). Using easily quantified rewards (e.g., money, points, etc.) is a common first step for new research questions because they allow for a “clean” operationalization of mathematic reward and risk probabilities. However, future work could nevertheless benefit from employing a greater diversity of risks and rewards. Lastly, follow-up studies could seek to probe whether specific decision-making processes (e.g., loss aversion) are affected

disproportionately by the opportunity to win for parents while losing for friends compared to the opposite.

The present study presents several constraints on generalizability (Simons, Shoda, & Lindsay, 2017). First, participants were exclusively recruited and tested in the western United States. It is possible that a different pattern of results would be observed elsewhere due to cultural differences surrounding parent-child relationships. Second, our nomination procedure involved each participant nominating just one parent and one friend. If we repeated the study with a different parent and close friend in the same participants, it is possible that the results would differ due to qualitative differences in relationship dynamics between the original and novel set of parents and friends. Lastly, because parts of our study used monetary rewards, the economic climate may have swayed decision-making behavior. Future replications taking place during an economic recession/depression may produce different results because of different financial pressures that individuals may be currently facing. We have no reason to believe that our results depend on other characteristics of the participants, materials, or context.

In sum, the present study makes a novel contribution by examining how young adults make decisions that pit rewards for a parent against rewards for a friend. Here, we show that individuals prioritize their parents over their friends when winning simulated rewards on their behalf. Together, these results contribute towards a nuanced understanding of how close others affect decision making processes during young adulthood.

References

- Abaied, J. L., & Emond, C. (2013). Parent psychological control and responses to interpersonal stress in emerging adulthood: Moderating effects of behavioral inhibition and behavioral activation. *Emerging Adulthood, 1*(4), 258–270. <https://doi.org/10.1177/2167696813485737>
- Armsden, G. C., & Greenberg, M. T. (1987). The inventory of parent and peer attachment: individual differences and their relationship to psychological well-being in adolescence. *Journal of Youth & Adolescence, 16*(5), 427–454. <https://doi.org/10.1007/BF02202939>
- Arnett, J. J. (2000). Emerging adulthood: A theory of development from the late teens through the twenties. *American Psychologist, 55*(5), 469–480. <https://doi.org/10.1037//0003-066X.55.5.469>
- Arnett, J. J. (2014). *Adolescence and Emerging Adulthood*. Boston, MA: Pearson.
- Botdorf, M., Rosenbaum, G. M., Patrianakos, J., Steinberg, L., & Chein, J. M. (2016). Adolescent risk-taking is predicted by individual differences in cognitive control over emotional, but not non-emotional, response conflict. *Cognition and Emotion, 1*–8. <https://doi.org/10.1080/02699931.2016.1168285>
- Branje, S. J. T., Hale, W. W., Frijns, T., & Meeus, W. H. J. (2010). Longitudinal associations between perceived parent-child relationship quality and depressive symptoms in adolescence. *Journal of Abnormal Child Psychology, 38*(6), 751–763. <https://doi.org/10.1007/s10802-010-9401-6>
- Bray, S., Shimojo, S., & O'Doherty, J. P. (2010). Human medial orbitofrontal cortex is recruited during experience of imagined and real rewards. *Journal of Neurophysiology, 103*(5), 2506–2512. <https://doi.org/10.1152/jn.01030.2009>
- Carlson, C. L. (2014). Seeking self-sufficiency: Why emerging adult college students receive and implement parental advice. *Emerging Adulthood, 2*(4), 257–269. <https://doi.org/10.1177/2167696814551785>
- Cauffman, E., Shulman, E. P., Steinberg, L., Claus, E., Banich, M. T., Graham, S., & Woolard, J. (2010). Age differences in affective decision making as indexed by performance on the iowa gambling task. *Developmental Psychology, 46*(1), 193–207. <https://doi.org/10.1037/a0016128>
- Cohen, A. O., Breiner, K., Steinberg, L., Bonnie, R. J., Scott, E. S., Taylor-Thompson, K. A., ... Casey, B. J. (2016). When is an adolescent an adult? Assessing cognitive control in emotional and nonemotional contexts. *Psychological Science, 27*(4), 549–562. <https://doi.org/10.1177/0956797615627625>
- Duell, N., Steinberg, L., Icenogle, G., Chein, J., Chaudhary, N., Di Giunta, L., ... Chang, L. (2017). Age patterns in risk taking across the world. *Journal of Youth and Adolescence*.
- Fanti, K. A., Henrich, C. C., Brookmeyer, K. A., & Kuperminc, G. P. (2008). Toward a Transactional Model of Parent-Adolescent Relationship Quality and Adolescent Psychological Adjustment. *Journal of Early Adolescence, 28*(2), 252–276. <https://doi.org/10.1177/0272431607312766>
- Figner, B., Mackinlay, R. J., Wilkening, F., & Weber, E. U. (2009). Affective and deliberative processes in risky choice: age differences in risk taking in the Columbia Card Task. *Journal of Experimental Psychology. Learning, Memory, and Cognition, 35*(3), 709–730. <https://doi.org/10.1037/a0014983>
- Fingerman, K. L., Huo, M., Kim, K., & Birditt, K. S. (2017). Coresident and noncoresident emerging adults' daily experiences with parents. *Emerging Adulthood, 5*(5), 337–350. <https://doi.org/10.1177/2167696816676583>

- Freitas, A. L., Gollwitzer, P. M., & Trope, Y. (2004). The influence of abstract and concrete mindsets on anticipating and guiding others self regulatory efforts. *Journal of Experimental Social Psychology*, 40, 739–752.
- Fromme, K., Corbin, W. R., & Kruse, M. I. (2008). Behavioral risks during the transition from high school to college. *Developmental Psychology*, 44(5), 1497–1504. <https://doi.org/10.1037/a0012614>.Behavioral
- Fuligni, A. J., & Pedersen, S. (2002). Family obligation and the transition to young adulthood. *Developmental Psychology*, 38(5), 856–868. <https://doi.org/10.1037/0012-1649.38.5.856>
- Gould, R. L. (1972). The phases of adult life: A study in developmental psychology. *American Journal of Psychiatry*, 129(5), 521–531. <https://doi.org/10.1176/ajp.129.5.521>
- Guassi Moreira, J. F., & Telzer, E. H. (2015). Changes in family cohesion and links to depression during the college transition. *Journal of Adolescence*, 43, 72–82. <https://doi.org/10.1016/j.adolescence.2015.05.012>
- Guassi Moreira, J. F., & Telzer, E. H. (2018). Longitudinal increases in family relationship quality and sensation seeking interact to increase risk raking in emerging adults. *Emerging Adulthood*, 6(1), 66–71.
- Hopmeyer, A., & Medovoy, T. (2017). Emerging adults’ self-identified peer crowd affiliations and college adjustment. *Emerging Adulthood*, 5(2), 143–148. <https://doi.org/10.1007/s11218-017-9390-1>
- Kang, M. J., Rangel, A., Camus, M., & Camerer, C. F. (2011). Hypothetical and real choice differentially activate common valuation areas. *Journal of Neuroscience*, 31(2), 461–468. <https://doi.org/10.1523/JNEUROSCI.1583-10.2011>
- Kaniūšonytė, G., & Žukauskienė, R. (2018). Relationships with parents, identity styles, and positive youth development during the transition from adolescence to emerging adulthood. *Emerging Adulthood*, 6(1), 42–52. <https://doi.org/10.1177/2167696817690978>
- Knoll, L. J., Magis-Weinberg, L., Speekenbrink, M., & Blakemore, S.-J. (2015). Social influence on risk perception during adolescence. *Psychological Science*, 26(5), 583–592. <https://doi.org/10.1177/0956797615569578>
- Levinson, D. J. (1986). A conception of adult development. *American Psychologist*, 41(1), 3–13. <https://doi.org/10.1037/0003-066X.41.1.3>
- Lucas-Thompson, R. G. (2014). Relationship quality with parents, stressful life events, and cortisol production in emerging adulthood. *Emerging Adulthood*, 2(2), 92–104. <https://doi.org/10.1177/2167696813503313>
- McCormick, E. M., & Telzer, E. H. (2017). Failure to retreat: Blunted sensitivity to negative feedback supports risky behavior in adolescents. *NeuroImage*, 147, 381–389. <https://doi.org/10.1016/j.neuroimage.2016.12.041>
- Miyapuram, K. P., Tobler, P. N., Gregorios-Pippas, L., & Schultz, W. (2012). BOLD responses in reward regions to hypothetical and imaginary monetary rewards. *NeuroImage*, 59(2), 1692–1699. <https://doi.org/10.1016/j.neuroimage.2011.09.029>
- Needham, B. L. (2008). Reciprocal relationships between symptoms of depression and parental support during the transition from adolescence to young adulthood. *Journal of Youth and Adolescence*, 37(8), 893–905. <https://doi.org/10.1007/s10964-007-9181-7>
- Ohannessian, C. M., Vannucci, A., Flannery, K. M., & Khan, S. (2017). Social media use and substance use during emerging adulthood. *Emerging Adulthood*, 5(5), 364–370. <https://doi.org/10.1177/2167696816685232>
- Peirce, J. W. (2007). PsychoPy-Psychophysics software in Python. *Journal of Neuroscience*

- Methods*, 162, 8–13. <https://doi.org/10.1016/j.jneumeth.2006.11.017>
- Riedijk, L., & Harakeh, Z. (2017). Imitating the risky decision-making of peers. *Emerging Adulthood*, 1–11. <https://doi.org/10.1177/2167696817722918>
- Roenneberg, T., Kuehnle, T., Pramstaller, P. P., Ricken, J., Havel, M., Guth, A., & Mero, M. (2004). A marker for the end of adolescence. *Current Biology*, 14(24), 1038–1039. <https://doi.org/10.1016/j.cub.2004.11.039>
- Roisman, G. I., Masten, A. S., Coatsworth, J. D., & Tellegen, A. (2004). Salient and emerging developmental tasks in the transition to adulthood. *Child Development*, 75(1), 123–133.
- Rudolph, M. D., Miranda-Domínguez, O., Cohen, A. O., Breiner, K., Steinberg, L., Bonnie, R. J., ... Fair, D. A. (2017). At risk of being risky: The relationship between “brain age” under emotional states and risk preference. *Developmental Cognitive Neuroscience*, 24, 93–106. <https://doi.org/10.1016/j.dcn.2017.01.010>
- Scholl, J., Kolling, N., Nelissen, N., Wittmann, M. K., Harmer, C. J., & Rushworth, M. F. S. (2015). The Good, the bad, and the irrelevant: Neural mechanisms of learning real and hypothetical rewards and effort. *Journal of Neuroscience*, 35(32), 11233–11251. <https://doi.org/10.1523/JNEUROSCI.0396-15.2015>
- Silva, K., Chein, J., & Steinberg, L. (2016). Adolescents in peer groups make more prudent decisions when a slightly older adult is present. *Psychological Science*, 27(3), 322–330. <https://doi.org/10.1177/0956797615620379>
- Simons, D. J., Shoda, Y., & Lindsay, D. S. (2017). Constraints on generality (COG): A proposed addition to all empirical papers. *Perspectives on Psychological Science*, 12(6), 1123–1128. <https://doi.org/10.1177/1745691617708630>
- Steinberg, L., Icenogle, G., Shulman, E. P., Breiner, K., Chein, J., Bacchini, D., ... Takash, H. M. S. (2017). Around the world, adolescence is a time of heightened sensation seeking and immature self-regulation. *Developmental Science*, ([EPub Ahead of Print]), 1–13. <https://doi.org/10.1111/desc.12532>
- Telzer, E. H., & Fuligni, A. J. (2013). Positive Daily Family Interactions Eliminate Gender Differences in Internalizing Symptoms Among Adolescents. *Journal of Youth and Adolescence*, 42(10), 1498–1511. <https://doi.org/10.1007/s10964-013-9964-y>
- Tsai, K. M., Telzer, E. H., & Fuligni, A. J. (2013). Continuity and discontinuity in perceptions of family relationships from adolescence to young adulthood. *Child Development*, 84(2), 471–484. <https://doi.org/10.1111/j.1467-8624.2012.01858.x>
- van Duijvenvoorde, A. C. K., Blankenstein, N. E., Crone, E. A., & Figner, B. (2017). Towards a better understanding of adolescent risk taking: Contextual moderators and model-based analysis. In M. E. Toplak & J. Weller (Eds.), *Individual differences in judgment and decision making from a developmental perspective* (pp. 8–27). New York, NY: Psychology Press. <https://doi.org/10.1128/AEM.00621-10>
- van Duijvenvoorde, A. C. K., Huizenga, H. M., Somerville, L. H., Delgado, M. R., Powers, A., Weeda, W. D., ... Figner, B. (2015). Neural correlates of expected risks and returns in risky choice across development. *The Journal of Neuroscience*, 35(4), 1549–60. <https://doi.org/10.1523/JNEUROSCI.1924-14.2015>
- Van Hoorn, J., Crone, E. A., & Van Leijenhorst, L. (2017). Hanging out with the right crowd: Peer influence on risk-taking behavior in adolescence. *Journal of Research on Adolescence*, 27(1), 189–200. <https://doi.org/10.1111/jora.12265>
- Welborn, B. L., Lieberman, M. D., Goldenberg, D., Fuligni, A. J., Galván, A., & Telzer, E. H. (2015). Neural mechanisms of social influence in adolescence. *Social Cognitive and*

- Affective Neuroscience*, 11(1), 100–109. <https://doi.org/10.1093/scan/nsv095>
- White, H. R., McMorris, B. J., Catalano, R. F., Fleming, C. B., Haggerty, K. P., & Abbott, R. D. (2006). Increases in alcohol and marijuana use during the transition out of high school into emerging adulthood: The effects of leaving home, going to college, and high school protective factors. *Journal of Studies on Alcohol*, 67(6), 810–822. <https://doi.org/10.15288/jsa.2006.67.810>
- Whiteman, S. D., McHale, S. M., & Crouter, A. C. (2011). Family relationships from adolescence to early adulthood: Changes in the family system following firstborns' leaving home. *Journal of Research on Adolescence*, 21(2), 461–474. <https://doi.org/10.1086/498510>

Supplemental Materials

Overview. The following materials touch upon a number of auxiliary features to our study.

First (1), we describe two additional supplemental procedures to verify the robustness of our results and verify the boundary conditions of the effects reported in the main document. The first of these procedures describes using Amazon's Mechanical Turk to obtain normative ratings of the phrases and adjectives participants described their nominees as in the parent and friend salience measure. Such data were used to create relatively objective measures of relationship quality and test the robustness of the moderating effects of relationship quality observed in the main document. This procedure was employed for both samples of the main study. The other procedure describes an additional experimental task administered in Sample 2 (real reward sample) to determine whether the effects in the main study generalized to decisions that were characterized by certainty, rather than uncertainty. This experimental task was administered as part of the overall procedure for Sample 2 and shared the same, pre-registered hypotheses as the CCT task (they are not listed here to avoid redundancy but interested readers can view them at osf.io/4pvxb).

Second (2), these materials list the supplementary hypothesis related to family obligation that was briefly mentioned in the beginning of the methods section of the main document.

Third (3), the materials here contain results from the main analysis broken down by sample. That is, the same analyses run in the main study are repeated here separately for each of the two samples (the sample that received simulated rewards for parent/friend (Sample 1) and the sample that received real rewards for parent/friend (Sample 2)). There is also a breakdown of how the association between decision make and return, and decision making and risk differ as a function of reward type (e.g., when rewards to parent/friend were simulated vs real).

Fourth (4), because approximately 95% of our sample was comprised of individuals aged 18-24.99, we ran re-ran our final model to verify our results were not disproportionately influenced by the oldest participants (25+; Table S7).

Lastly (5), we disclose the entire list of self-reported measures that were collected in this study. Notably, no analyses were run with self-report measures other than those referenced in the main document. Thus, as of this submission, data from these additional measures have not been analyzed.

Supplemental Hypothesis

Supplemental Hypothesis 1. Participants who perceive greater obligation to their parent will be more likely to make decisions that benefit a parent at the expense of a friend (moderation). Similarly, participants who perceive greater obligation to their friend will be more likely to make decisions that benefit a friend at the expense of a parent (moderation). This was a post-hoc exploratory question in our first sample and a pre-registered hypothesis in the second sample.

Supplemental Methods for Data Collection with Amazon's Mechanical Turk

Participants. Participants were recruited through Amazon’s Mechanical Turk by a study advertisement asking them to rate adjectives and phrases used to describe individuals. This was done separately by sample. For Sample 1 adjective/phrases, we constrained our participants to individuals who were of college-age, and thus only allowed individuals between the ages of 18-22 to participate. We arbitrarily decided to collect data on 60 participants (19 Female, $M_{age} = 21.03$). For Sample 2 adjectives/phrases, we decided to collect a similar number of participants ($n = 50$; 21 Female, $M_{age} = 26.32$) while widening the eligible age range to be more consistent with the population sample recruited from the general West Los Angeles area.

Procedure. Participants responded to a HIT request asking individuals to “rate traits and phrases commonly used to describe individuals on how positive or negative they are.” Individuals then rated adjectives/phrases (Sample 1 $n = 412$; Sample 2 $n = 435$) according to the following prompt “These are words and phrases that have been used by individuals to describe close others. Please rate the following words/phrases on a scale of 1 to 7 based on what you think about the word/phrase.” The anchors on the likert scale were 1 = extremely negative, 4 = neutral, 7 = extremely positive. All adjectives/phrases in both were presented in alphabetical order across many pages on a survey administered via Qualtrics. A very small number (less than 10) of items participants provided were either not rated or not included in final analyses because they were deemed to be inappropriate descriptors of others (e.g., “chocolate” or “glasses”).

In addition to rating these traits, MTurk participants for Sample 1 adjectives/phrases also completed two modified versions of the Respect for Family Subscale of the Family Obligation Scale (Fulgini & Tseng, 2008). Typically, participants are asked to rate how important they regard a set of behaviors that indicate obligation for one’s family. For the first version, we modified the subscale by changing all items to ask about parents (as opposed to other family members) and subsequently omitting redundant items, yielding a five-item measure. A sample item includes “How important is it to you that you to make sacrifices for your parents?” The second version was identical to the first version except all items were changed to ask about friends (instead of parents) and one item was omitted (“Follow your parents’ advice about choosing friends.”), producing a four-item measure. A sample item is “How important is it to you that you treat your friends with great respect?” Thus, there were two separate scales, one tapping obligation to one’s friends and the other measured obligation to one’s parents. A single score for each scale was calculated by averaging items. Both versions are available with the rest of the study materials on the OSF. Due to experimenter error, one item of the friend obligation scale was worded incorrectly when collecting data via MTurk. Though the corrected version of the item is listed on OSF, all analyses with this measure reported here reflect scores calculated without this item. Both measures displayed adequate to good reliability (Parent $\alpha = 0.88$, Friend $\alpha = 0.65$).

The rationale for choosing the Respect for Family Subscale instead of using the full measure or other subscales was because the other subscales (i) did not contain items that were easily adapted to ask about friends and (ii) tended to assess obligation in scenarios that one typically encounters with family but not friends, potentially biasing reports of obligation.

The measure was not collected on the Sample 2 MTurk participants because it was instead administered to the main study participants with the intention of testing whether family/parent obligation scores moderated the trial-level association between Condition and

decision making, thereby lending insight into potential motivational causes behind decision making behaviors.

Supplemental Self-Report Measures. The following measures were collected on main study participants (both samples) for the possibility of running additional, exploratory analyses or to test future research questions orthogonal to the ones presented in the main study. The health and social subscales of the adolescent version of the Domain Specific Risk Taking Scale (DOSPERT; Blais & Weber, 2006; Figner & Weber, 2011) and the 8-item Brief Sensation Seeking Scale (BSSS-8; Hoyle et al., 2002).

Supplemental Methods for Other-Oriented Decision Making Under Conditions of Certainty.

As noted in the main document, an additional, less imminent aim of our study was to also characterize how young adults prioritized parents and peers in trade-offs that were certain in nature (as opposed to uncertain). To this end, Sample 2 participants also completed an adapted version of a family assistance task (Telzer, Masten, Berkman, Lieberman, & Fuligni, 2010; Moll et al., 2006).

In our version of the task (referred to as the Donations Task), individuals were instructed to make choices about point allocation proposals that had conflicting outcomes for their nominated parent and friend. Specifically, on each trial, one individual (parent or friend) would stand to gain a given number of points while the other would be poised to lose a number of points. Individuals were instructed to either reject or accept each proposal. The gain amounts for each proposal could vary between +70, +60, +50, +40, while the loss amounts could vary between -70, -60, -50, -40, -30, -20, -10. Each gain value was paired with loss values whose absolute values were at most equivalent and at least no lower than 30 points less e.g., +70 was always paired with either -70, -60, -50, -40. This configuration is in line with previous versions of the task (Telzer et al., 2010; Telzer, Fuligni, Lieberman, & Galvan, 2014), and yielded 16 distinct trial types, each of which were repeated 8 times for a total task length of 128 trials. Participants were told their decisions during the task would also affect the initial \$5 endowment their parent and friend received at the start of the study.

We opted to analyze the task in the same fashion as the CCT. The following HLM models were used to analyze the Donations Task in manner that was analogous to the CCT analyses.

Level 1 (within-participant):

$$(1) \quad \text{Logit}(\text{Decision}_{it}) = \pi_{0i} + \pi_{1i}(\text{Condition}) + \pi_{2i}(\text{Gain Amt}) + \pi_{3i}(\text{Loss Amt}) + \varepsilon_{it}$$

Level 2 (between-participants):

$$(2) \quad \pi_{0i}(\text{intercept}) = \gamma_{00} + \gamma_{01}(\text{Age}) + \gamma_{02}(\text{Sex}) + \gamma_{03}(\text{PRQ}) + \gamma_{04}(\text{FRQ}) + u_{0i}$$

$$(3) \quad \pi_{1i}(\text{Condition}) = \gamma_{10} + \gamma_{11}(\text{Age}) + \gamma_{12}(\text{Sex}) + \gamma_{13}(\text{PRQ}) + \gamma_{14}(\text{FRQ}) + u_{1i}$$

$$(4) \quad \pi_{2i}(\text{Gain Amt}) = \gamma_{20} + \gamma_{21}(\text{Age}) + \gamma_{22}(\text{Sex}) + \gamma_{23}(\text{PRQ}) + \gamma_{24}(\text{FRQ}) + u_{2i}$$

$$(5) \quad \pi_{3i}(\text{Loss Amt}) = \gamma_{30} + \gamma_{31}(\text{Age}) + \gamma_{32}(\text{Sex}) + \gamma_{33}(\text{PRQ}) + \gamma_{34}(\text{FRQ}) + u_{3i}$$

In these equations, Decision refers to the i th decision for the i th individual during the Donations task (0 = reject proposal; 1 accept proposal). Condition still denotes whether a friend stood to gain at the expense of a parent (0) or if a parent stood to gain at the expense of the friend (1), but now does so for certain decisions. Thus, a positive association between Condition and $\text{logit}(\text{Decision})$ would mean that individuals were more likely to accept allocation proposals if a parent benefitted over a friend whereas a negative association would indicate the opposite. These models control for the amount a given target (parent/friend) was poised to receive on a given trial (Gain Amt) and the absolute value that the other target stood to lose (Loss Amount). As was the case with the CCT data in the main document, we first ran only the Level 1 model. Afterward, we added age and sex as covariates to level 2. Finally, we added additional scores of self-reported parent and friend relationship. Reward Type was not a covariate in this analysis since this task was only collected on the sample who could earn real rewards for parents and friends. All aforementioned analyses were pre-registered prior to collection of data for Sample 2 and are available on the OSF.

Supplemental Results

Independent ratings of parent and friend traits replicate findings with relationship quality. After obtaining the MTurk ratings for each adjective/phrase, we averaged the ratings for each participant's adjectives/phrases describing their parent and friend into separate single scores (e.g., 1 average rating of all parent descriptors, 1 average rating of all friend descriptors). Next, we entered these scores in our previous hierarchical linear model in place of the IPPA (relationship quality) scores. As shown in Table S1, Panel A, these analyses yielded results that replicated the prior finding with self-report scores of relationship quality in Sample 1, thereby providing converging evidence for our initial effect. Table S1, Panel B depicts results for Sample 2 that yielded highly similar parameter estimates of the moderation effect that trended towards significance.

Family obligation as a motivator. After obtaining our results, we suspected they may be due to the fact that our participants may have relied on their parents for critical types of support that they do not receive from their friends (e.g., financial support). Thus, they may have felt more indebted towards their parents and felt obligated to prioritize them while completing the task. Since we did not collect measures of parent or friend obligation on sample in Sample 1 (i.e., subject pool), we opted to collect it as part of our follow-up MTurk study for Sample 1 to determine whether college-aged individuals evince self-reported differences in perceived obligation to parents or friends. A paired samples t-test revealed no significant differences between levels of perceived obligation towards parents and friends ($M_{\text{Parent Obligation}} = 3.37$, $M_{\text{Friend Obligation}} = 3.42$; $t(59) = -0.54$, $p > .250$). Consequently, although results to this follow-up analysis do not entirely rule out the possibility that differences obligation are driving our primary findings, they are ultimately inconclusive. Neither parent obligation nor friend obligation were significantly correlated with age ($r_s = .05, .17$ respectively), though both were highly correlated with each other ($r = .71$, $p < .001$).

The relationship between Condition and decision making for certain choices. As shown in Table S2, there were also no significant associations between Condition and decision making during instances of certain decision making. This suggests that the prioritization of individuals' parents vs friends when making decisions that have conflicting outcomes for each is

invariant to certainty/uncertainty. Curiously, we observed a marginally significant moderating effect of age on the association between Condition and decision making in the anticipated direction (e.g., older individuals tend to favor parents over friends). This could suggest the presence of an age x decision setting (certain/uncertain) x Condition interaction such that older individuals (i.e., young adults) only favor their parents as the decision making setting becomes increasingly certain. With that said, this was the only model that showed an effect of age in the expected direction out of several similar analyses and therefore significant caution is required when interpreting these results. Lastly, we replicated the main document's findings with respect to the relationship quality. Though not depicted in the table, similar results (both in terms of parameter estimates and statistical significance) are obtained when swapping self-reported relationship quality with self-reported perceived obligation scores. These results further underscore the notion that individual differences in relationship quality with ones parents and friends may be the greatest determinant in how one chooses prioritize said social agents.

Results Split by Sample. Table S3 depicts the results of the unconstrained (Level 1 only) model for Sample 1. Table S4 shows results for testing Hypothesis 2 and Hypothesis 3 (Panels A and B, respectively). Table S5 depicts the results of the unconstrained model for sample 2. Table S6 shows results for testing Hypothesis 2 and Hypothesis 3 (Panels A and B, respectively). The fixed effect for Condition is positive and significant for the Sample 1 (simulated) but not for Sample 2 (real).

Additionally, splitting the results up by sample served as a way to follow-up on the significant interaction between Reward Type and Return and Risk (respectively, reported in the main document). Although the interaction term was significant, the effect of Return on decision making was identical in the two samples (.055 for sample 1 (simulated), .055 for sample 2 (real)). There was a similar trend for the effect of Risk (-.052 for sample 1 (simulated), -.066 for sample 2 (real)). Thus, although there was a statistically significant interaction between Reward Type and Return in addition to Reward Type and Risk, follow-up analyses reveal that reward type appeared to have a negligible impact on Return and Risk sensitivities during the performance on the CCT.

Table S1. Trial-by-trial association between risky decision making and Condition, Return and Risk with supplemental level two moderators. Panel A depicts results for Sample 1 adjectives/phrases; Panel B depicts results for Sample 2.

Predictor	A			B		
	γ	<i>SE</i>	<i>p</i>	γ	<i>SE</i>	<i>p</i>
Intercept						
Intercept	2.579	.123	<.001	2.420	.134	<.001
Sex	-0.043	.136	.752	0.350	.168	.040
Age	0.014	.028	.609	-0.018	.028	.520
Parent TR	-0.096	.063	.132	-0.104	.085	.225
Friend TR	0.283	.084	.001	0.191	.126	.132
Condition						
Intercept	0.239	.082	.005	0.010	.094	.918
Sex	-0.037	.089	.680	0.000	.116	.997
Age	-0.007	.017	.690	0.002	.016	.915
Parent TR	0.126	.047	.009	0.112	.079	.160
Friend TR	-0.202	.054	.001	-0.138	.087	.116
Return						
Intercept	0.053	.005	<.001	0.086	.009	<.001
Sex	-0.025	.006	<.001	-0.039	.011	.001
Age	-0.002	.001	.069	-0.004	.002	.049
Parent TR	0.000	.003	.861	-0.015	.005	.002
Friend TR	-0.010	.005	.048	0.002	.007	.801
Risk						
Intercept	-0.052	.004	<.001	-0.063	.005	<.001
Sex	0.003	.005	.483	0.002	.007	.813
Age	0.001	.001	.361	0.000	.001	.760
Parent TR	0.001	.003	.765	0.005	.003	.121
Friend TR	-0.002	.003	.545	-0.006	.005	.298

Note. Sex was coded Male=0, Female = 1. Condition was coded such that a 0 = friend gain/parent lose, 1 = parent gain/friend lose. Return (EV) ranged from -60 to 16.88 and SD ranged from 9.68 to 40. TR = trait ratings. γ -s are fixed effects and represent expected changes in log odds. Robust standard errors are reported from a population-average model.

Table S2. Trial-by-trial association between risky decision making and Condition, Gain Amt and Loss Amt. Panel A depicts the unconstrained model, Panel B includes sex and age as level 2 moderators and Panel C expands to also include self-reported parent and friend relationship quality.

Predictor	A			B			C		
	γ	SE	p	γ	SE	p	γ	SE	p
Intercept									
Intercept	-0.342	.176	.055	-0.295	.320	.359	-2.029	1.051	.057
Sex	-	-	-	-0.076	.388	.846	-0.251	.381	.511
Age	-	-	-	0.072	.051	.164	0.086	.046	.063
Parent RQ	-	-	-	-	-	-	-0.690	.255	.009
Friend RQ	-	-	-	-	-	-	0.947	.359	.010
Condition									
Intercept	0.011	.128	.930	-0.201	.240	.406	-1.751	.906	.056
Sex	-	-	-	0.339	.306	.272	0.467	.254	.069
Age	-	-	-	0.081	.040	.046	0.068	.039	.081
Parent RQ	-	-	-	-	-	-	0.571	.183	.003
Friend RQ	-	-	-	-	-	-	-0.735	.244	.004
Gain Amt									
Intercept	0.053	.005	<.001	0.055	.007	.000	0.140	.029	<.001
Sex	-	-	-	-0.003	.009	.727	-0.003	.010	.742
Age	-	-	-	-0.004	.001	.002	-0.004	.001	.002
Parent RQ	-	-	-	-	-	-	0.008	.007	.232
Friend RQ	-	-	-	-	-	-	-0.005	.009	.584
Loss Amt									
Intercept	-0.079	.004	<.001	-0.075	.007	<.001	-0.104	.026	<.001
Sex	-	-	-	-0.006	.009	.483	-0.004	.009	.686
Age	-	-	-	0.001	.001	.284	0.001	.001	.248
Parent RQ	-	-	-	-	-	-	-0.002	.006	.695
Friend RQ	-	-	-	-	-	-	-0.007	.008	.398

Note. Sex was coded Male=0, Female = 1. Condition was coded such that a 0 = friend gain/parent lose, 1 = parent gain/friend lose. Gain Amt ranged from 40-70, increasing in increments of 10. Loss Amt ranged from 10 to 70 (absolute value), increasing in increments of 10. RQ=relationship quality. γ -s are fixed effects and represent expected changes in log odds. Robust standard errors are reported from a population-average model. These findings only reflect data from Sample 2 (the realreward sample), as the donations task was only administered to that sample.

Table S3. Trial-by-trial association between risky decision making and Condition, Return and Risk (Sample 1)

Predictor	γ	SE	p
Intercept	2.546	.053	<.001
Condition	0.219	.035	<.001
Return	0.034	.003	<.001
Risk	-0.049	.002	<.001

Note. Condition was coded such that a 0 = friend gain/parent lose, 1 = parent gain/friend lose. Return (EV) ranged from -60 to 16.88 and SD ranged from 9.68 to 40. Bs represent log odds. Robust standard errors are reported from a population-average model. γ -s are fixed effects and represent expected changes in log odds. Robust standard errors are reported from a population-average model.

Table S4. Trial-by-trial association between risky decision making and Condition, Return and Risk with level two moderators. Panel A lists the results of HLM models to test Hypothesis 2 (Sample 1). Panel B lists analyses of additional HLM models to test hypothesis 3 (Sample 1).

Predictor	A			B		
	<i>b</i>	<i>SE</i>	<i>p</i>	<i>b</i>	<i>SE</i>	<i>p</i>
Intercept						
Intercept	2.600	.130	<.001	2.586	.135	<.001
Sex	-0.071	.143	.617	-0.054	.147	.712
Age	0.020	.031	.523	0.022	.028	.427
Parent RQ	-	-	-	-0.205	.087	.021
Friend RQ	-	-	-	0.082	.082	.321
Condition						
Intercept	0.230	.087	.010	0.258	.084	.003
Sex	-0.015	.095	.878	-0.016	.093	.862
Age	-0.016	.017	.354	-0.013	.017	.432
Parent RQ	-	-	-	0.153	.062	.016
Friend RQ	-	-	-	-0.321	.082	<.001
Return						
Intercept	0.052	.005	<.001	0.055	.005	<.001
Sex	-0.023	.006	<.001	-0.024	.006	<.001
Age	-0.003	.001	.053	-0.003	.001	.030
Parent RQ	-	-	-	0.010	.004	.008
Friend RQ	-	-	-	-0.020	.005	.001
Risk						
Intercept	-0.052	.004	<.001	-0.052	.005	<.001
Sex	0.004	.005	.445	0.003	.005	.508
Age	0.001	.001	.405	0.001	.001	.391
Parent RQ	-	-	-	0.004	.003	.158
Friend RQ	-	-	-	-0.001	.005	.920

Note. Sex was coded Male=0, Female = 1. Condition was coded such that a 0 = friend gain/parent lose, 1 = parent gain/friend lose. Return (EV) ranged from -60 to 16.88 and SD ranged from 9.68 to 40. RQ stands for 'relationship quality'. γ -s are fixed effects and represent expected changes in log odds. Robust standard errors are reported from a population-average model.

Table S5. Trial-by-trial association between risky decision making and Condition, Return and Risk (Sample 2)

Predictor	γ	<i>SE</i>	<i>p</i>
Intercept	2.620	.068	<.001
Condition	0.019	.041	.640
Return	0.059	.004	<.001
Risk	-0.061	.003	<.001

Note. Condition was coded such that a 0 = friend gain/parent lose, 1 = parent gain/friend lose. Return (EV) ranged from -60 to 16.88 and SD ranged from 9.68 to 40. Bs represent log odds. Robust standard errors are reported from a population-average model. γ -s are fixed effects and represent expected changes in log odds. Robust standard errors are reported from a population-average model.

Table S6. Trial-by-trial association between risky decision making and Condition, Return and Risk with level two moderators. Panel A lists the results of HLM models to test Hypothesis 2 (Sample 2). Panel B lists analyses of additional HLM models to test hypothesis 3 (Sample 2).

Predictor	A			B		
	<i>b</i>	<i>SE</i>	<i>p</i>	<i>b</i>	<i>SE</i>	<i>p</i>
Intercept						
Intercept	2.423	.135	<.001	2.563	.131	<.001
Sex	0.337	.166	.045	0.223	.166	.183
Age	-0.016	.026	.548	-0.014	.028	.614
Parent RQ	-	-	-	-0.343	.071	<.001
Friend RQ	-	-	-	0.547	.142	<.001
Condition						
Intercept	0.005	.095	.955	-0.085	.092	.361
Sex	0.020	.112	.862	0.092	.114	.421
Age	0.001	.015	.924	0.001	.016	.941
Parent RQ	-	-	-	0.223	.064	.001
Friend RQ	-	-	-	-0.296	.098	.004
Return						
Intercept	0.087	.009	<.001	0.055	.009	<.001
Sex	-0.043	.011	<.001	-0.024	.011	<.001
Age	-0.005	.002	.019	-0.003	.002	.025
Parent RQ	-	-	-	0.010	.005	.057
Friend RQ	-	-	-	-0.020	.009	.893
Risk						
Intercept	-0.062	.005	<.001	-0.066	.006	<.001
Sex	0.002	.007	.748	0.003	.007	.640
Age	0.000	.001	.762	0.000	.001	.760
Parent RQ	-	-	-	0.006	.003	.084
Friend RQ	-	-	-	-0.007	.007	.342

Note. Sex was coded Male=0, Female = 1. Condition was coded such that a 0 = friend gain/parent lose, 1 = parent gain/friend lose. Return (EV) ranged from -60 to 16.88 and SD ranged from 9.68 to 40. RQ stands for 'relationship quality'. γ -s are fixed effects and represent expected changes in log odds. Robust standard errors are reported from a population-average model.

Table S7. Results of our final model in individuals aged 18-24.99

Predictor	<i>B</i>		
	γ	<i>SE</i>	<i>p</i>
Intercept			
Intercept	2.439	.107	<.001
Sex	0.114	.111	.303
Reward Type	0.202	.087	.022
Parent RQ	-0.311	.059	<.001
Friend RQ	0.346	.082	<.001
Condition			
Intercept	0.214	.066	.002
Sex	0.046	.070	.518
Reward Type	-0.288	.055	<.001
Parent RQ	0.189	.045	<.001
Friend RQ	-0.290	.064	<.001
Return			
Intercept	0.056	.005	<.001
Sex	-0.028	.006	<.001
Reward Type	0.021	.005	<.001
Parent RQ	-0.001	.003	.697
Friend RQ	-0.011	.005	.027
Risk			
Intercept	-0.051	.004	<.001
Sex	0.002	.004	.583
Reward Type	-0.012	.003	<.001
Parent RQ	0.005	.002	.018
Friend RQ	-0.004	.004	.344

Note. Age is no longer included in the model after truncating its range. Sex was coded Male=0, Female = 1. Condition was coded such that a 0 = friend gain/parent lose, 1 = parent gain/friend lose. Return (EV) ranged from -60 to 16.88 and SD ranged from 9.68 to 40. RQ stands for ‘relationship quality’. Reward Type was coded 0 = simulated, 1 = real. γ -s represent expected change in log odds. Robust standard errors are reported from a population-average model.