Reinforcement sensitivity theory and relationship satisfaction via mastery

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ABSTRACT

This study aimed to advance understanding of RST personality and romantic relationships. It examined the link between revised Reinforcement Sensitivity Theory (RST) and relationship satisfaction via the mediator mastery. The sample consisted of 110 United States participants who reported being in an exclusive relationship. The measures examined were Reinforcement Sensitivity Theory Personality Questionnaire (RST-PQ), Relationship Assessment Scale (RAS), and Jackson's Mastery scale. The results highlight that revised Behavioral Approach Systems (BAS) and Reward Interest (BAS-RI) predicted relationship satisfaction. Mastery mediated BAS, BAS-RI, and Reward Reactivity (BAS-RR) with relationship satisfaction. Additionally, revised Behavioral Inhibition System (BIS) and Impulsivity (BAS-IMP) negatively predicted relationship satisfaction. Individuals with high reward sensitivity and mastery may put more cognitive effort into a romantic relationship believing it is a goal that will reward them with happiness.
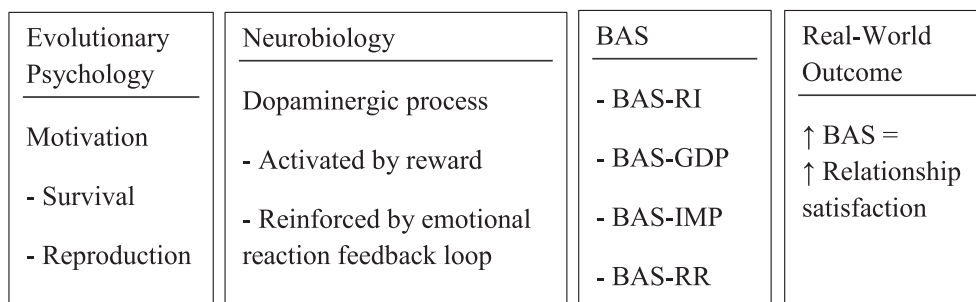
1. Introduction

Healthy romantic relationships are good for well-being and have wide spread benefits. A key factor for healthy romantic relationships is personality (Del Giudice, Gangestad, & Kaplan, 2015). Many studies have shown the "Big Five" personality dimensions relate to romantic relationships (White, Hendrick, & Hendrick, 2004). However, the role of RST in romantic relationships is still largely unknown. RST is one of the major biological models of individual differences in motivation, emotion, and learning that links reinforcement processes with personality (Collins, Jackson, Walker, O'Connor, & Gardiner, 2017). The application of RST to practical real-world outcomes are much needed. Empirical support is lacking for the many individuals wanting to know how to have healthy relationships when statistics show one in three American marriages end in divorce (Marcassa, 2013). Individuals dealing with divorce can face negative personal, social, and economic consequences (Hollander, 2017). Clinicians, at best, have modest results of evidence-based therapy in controlled trials, while evidence for the effectiveness of community-based services lag behind (Schofield, Mumford, Jurkovic, Jurkovic, & Bickerdike, 2012). Therefore, research in this field is vital. A well-known indicator of healthy romantic relationships is relationship satisfaction. The purpose of this study is to examine the links between RST and relationship satisfaction via the mediator mastery. The components of RST explored were the Behavioral Approach Systems (BAS) and the Behavioral Inhibition System (BIS) (Table 2).

1.1. Revised reinforcement sensitivity theory (RST)

The reinforcement sensitivity theory is a neurobiologically-based theory of personality (Walker, Jackson, & Frost, 2017). The theory suggests that basic motivation entails approach and avoidance of appetitive and aversive stimuli, respectively (Gray & McNaughton, 2000). These responses to reinforcers are proposed to be mediated by the sensitivity of neurobiology and individual differences, contributing to personality variation (Corr, 2008). Therefore, RST explains personality via a strong basic personality model that is grounded in neuroscience and animal learning (Walker et al., 2017). Gray's model of personality proposes the existence of three brain circuits, which represent general emotional-motivational systems: BAS, BIS, and Fight, Flight Freeze System (FFFS).

The BAS is referred to as the reward system relating to dopaminergic neurotransmissions. It is a sense of "Let's go for it!" (Corr & Cooper, 2016). The BAS may be conceptualized as having four sequential components: Reward Interest (BAS-RI), representing identification of the biological resource; Goal-Drive Persistence (BAS-GDP), reflecting planning behavior on how to attain the resource; Impulsivity (BAS-IMP), encompassing fast reaction to executing plans; and Reward Reactivity (BAS-RR), the emotional reaction on attaining the resource forming a positive feedback loop (Corr & Cooper, 2016). States of emotion serve as internal motivators of behavior. Therefore, high BAS sensitivity has been linked with well-being (Harnett, Loxton, & Jackson, 2013).

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Evolutionary Psychology	Neurobiology	BAS	Real-World Outcome
Motivation	Dopaminergic process	- BAS-RI	↑ BAS = ↑ Relationship satisfaction
- Survival	- Activated by reward	- BAS-GDP	
- Reproduction	- Reinforced by emotional reaction feedback loop	- BAS-IMP	
		- BAS-RR	

Fig. 1. How the RST theory of BAS connects with relationship satisfaction. BIS = Behavioral Inhibition System; BAS = Behavioral Approach System; BAS-RI = Reward Interest; BAS-GDP = Goal Driven Persistence; BAS-RR = Reward Reactivity; BAS-IMP = Impulsivity.

From an evolutionary standpoint, BAS reflects a resource acquisition mechanism that has been shown to be important in everyday life (Kenrick & Shiota, 2008). Evolutionary psychologists theorize approach behaviors originate from needs and desires to reproduce and survive. The elements of insight, planning, and control found in BAS-RI, BAS-GDP, and BAS-RR were shown to relate to a slow lifestyle, which is evolutionarily adaptive in stable environments with low mortality (Krupić, Banai, & Corr, 2018). Satisfied couples usually adopt slow lifestyles, perceiving themselves as more agreeable, conscientious, and honest, while tending to have more stable close relationships, fewer offspring, and higher parental involvement (Del Giudice et al., 2015). The role of RST in romance needs to be further explored, especially as romantic relationships are an evolutionary imperative and RST has links with evolutionary psychology. Fig. 1 displays how the evolutionary and RST theory of BAS connects with relationship satisfaction.

The BIS is referred to as the punishment system and is responsible for solving conflicts of approach and avoidance. Before the conflict is resolved, individuals with high BIS may be consumed by the feeling of anxiety, worry, and rumination while risk assessing and intensely analyzing their memory and environment (Corr, 2008). It is the sense of "Watch out for danger!" (Corr, 2008). Individuals with high BIS may be prone to depression and anxiety disorders (Harnett et al., 2013). Extensive research links BIS with attachment insecurity (Jiang & Tiliopoulos, 2014). These results align with Gray and McNaughton's (2000) theory that painful conflicts of approach and avoidance stem from inconsistent or unresponsive reinforcement from a primary attachment figure.

1.2. Relationship satisfaction

Relationship satisfaction and the RST have not been explored together before. However, links show life satisfaction and psychological well-being are positively associated with BAS and negatively associated with BIS (Harnett et al., 2013). Similarly, links show relationship satisfaction correlates with life satisfaction (Pavot & Diener, 1993). A meta-analysis by Malouff, Thorsteinsson, Schutte, Bhullar, and Rooke (2010) concluded the personality trait of high extroversion as a significant predictor of intimate relationship satisfaction. BAS is associated with extroversion and novelty seeking (Corr, 2008). Individuals with BAS and individuals with secure attachment both display more daily positive affect and less anger/irritability (Hundt et al., 2013). Therefore, evidence indicates an association between RST and relationship satisfaction.

1.3. Mastery

Mastery is a form of goal orientation and is a model of learning and competence associated with effort. Individuals who score highly on mastery tend to be adaptive and have high self-efficacy and persistence when pursuing specific, difficult, and challenging goals (Jackson, 2005). Low mastery is described as having low self-efficacy, effort, and

persistence. Previous research proposes mastery is a mediator that re-expresses undirected energy toward functional outcomes (Elliot & Thrash, 2010; Jackson, 2008; Walker & Jackson, 2014). BAS, is conceptualized as a distal driver of reward-oriented behavior (Clark, Loxton, & Tobin, 2015). Past research suggests, an individual's desire to achieve rewards may re-express this energy into goals that require effort, such as actively improving relationship satisfaction.

Similarly, previous literature indicates a significant positive relationship between extroversion and mastery (Reshma & Manjula, 2016). Thus, research indicates benefits to wanting to grow in relationships and improve with effort (Knee, Patrick, Vietor, Nanayakkara, & Neighbors, 2002). Therefore, it seems fitting that individuals with a high level of mastery have a higher chance at relationship satisfaction because good relationships require much effort. Therefore, the links between mastery, relationship satisfaction, and RST needs further investigation.

Past research has not examined the association between mastery and relationship satisfaction with RST. Furthermore, most studies have used outdated RST scales because no widely used standard scale established for RST yet (Jiang & Tiliopoulos, 2014). Therefore, using the arguably most up to date measure of RST must be extensively replicated to ensure its reliability and validity. Lastly, literature exploring RST and its subscales, in relation to positive romantic relationships is lacking.

1.4. Aims and hypotheses

This study aims to examine the links between RST and relationship satisfaction via the mediator mastery. Hypothesis 1 is that BAS sensitivity will positively predict relationship satisfaction. Hypothesis 2 is that the subcategories of BAS sensitivity will positively predict relationship satisfaction. Hypothesis 3 is that BIS sensitivity will negatively predict relationship satisfaction. Hypothesis 4 is that the direct relationships of the first two hypotheses will be mediated by Mastery. An association between FFFS and relationship satisfaction was not expected. Fig. 2 displays the hypotheses.

2. Method

2.1. Participants

The inclusion criteria were adults above 18 years from the United States who were in an exclusive relationship ($N = 110$, 63 women, 47 men, $M_{age} = 34.85$ years, $SD_{age} = 9.88$ years, age range: 19–68 years). There was a full response rate. The ethnic backgrounds included Caucasian (75%), Hispanic/Latino (9%), Asian (8%), African American (6%), Pacific Islander (1%) and other (1%). The self-declared relationship status of participants was married or cohabiting (62%), dating (32%), and engaged (6%). While we cannot guarantee the participants were in an exclusive relationship, there was no indication of fake responding and being in an exclusive relationship is common. The sexual orientation of the participants was heterosexual (90%),
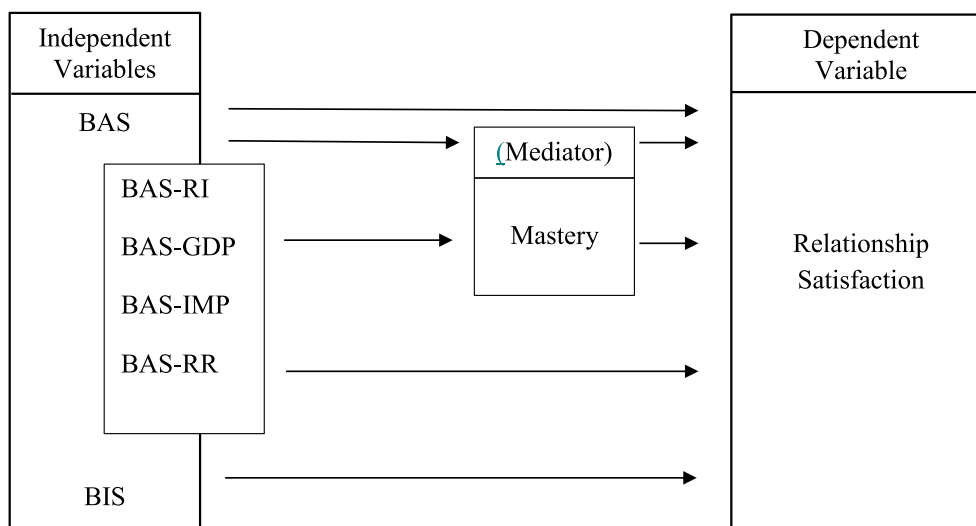
Fig. 2. Examining the links between RST and relationship satisfaction via mastery. BIS = Behavioral Inhibition System; BAS = Behavioral Approach System; BAS-RI = Reward Interest; BAS-GDP = Goal Driven Persistence; BAS-RR = Reward Reactivity; BAS-IMP = Impulsivity.

homosexual (4%), and bisexual (6%). The average relationship length was 5.67 years (SD = 6.86 years). A post-hoc power analysis using G*Power (Faul, Erdfelder, Lang, & Buchner, 2007) suggested this sample has 91% power to detect a medium sized effect at the 0.05 level of significance, which is above Cohen's (1988) threshold of 80% power and suggests this study is adequately powered.

2.2. Materials

2.2.1. Revised Reinforcement Sensitivity Theory Personality Questionnaire (RST-PQ; Corr & Cooper, 2016)

The Reinforcement Sensitivity Theory Personality Questionnaire is a 65 item questionnaire that assesses RST motivations on a 4-point scale ranging from 1 (*not at all*) to 4 (*highly*). Revised BAS was an overall index comprised of four subscales: BAS-RI (7 items) such as "I regularly try new activities just to see if I enjoy them", BAS-GDP (7 items) such as "I put in a big effort to accomplish important goals in my life", BAS-RR (10 items) such as "Sometimes even little things in life can give me great pleasure", and BAS-IMP (8 items) such as "I often do risky things without thinking of the consequences." And the BIS scale consisted of 23 items with items such as "I feel sad when I suffer even minor setbacks." In this study, the internal reliability for these scales were acceptable (α = 0.79 to 0.95). Some strengths of the RST-PQ are that it had five studies in initial validation, has been available online for several years so thus becoming established in the literature, including in studies beyond the original authors (Walker & Jackson, 2017). This suggests acceptance by the RST research community.

2.2.2. Relationship Assessment Scale (RAS; Hendrick, 1988)

This well-established relationship satisfaction scale consisted of seven items on a five point scale ranging from 1 (*low*) to 5 (*high*). The items included where "How well does your partner meet your needs?", "In general, how satisfied are you with your relationship?", "How good is your relationship compared to most", "How often do you wish you hadn't gotten into this relationship?" "To what extent has your relationship met your original expectations?", "How much do you love your partner?", and "How many problems are there in your relationship?". Two of these items were reversed scored. In this study, the scale demonstrated acceptable internal reliability (α = 0.96). This scale has shown noteworthy precision when measuring couples' satisfaction (Funk & Rogge, 2007) and predictive value for demonstrating which variables result in individuals having high or low relationship satisfaction (Gable, Reis, Impett, & Asher, 2004).

2.2.3. Mastery (Jackson, 2008)

Mastery is putting in cognitive effort into achieving learning goals despite setbacks. This mastery scale consists of 15 items on a five point scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Examples of items were "I achieve specific goals that I set myself", "My plans almost always lead to success", and "I like to be challenged." Several studies have validated this scale (e.g., Jackson, Izadikhah, & Oei, 2012; Walker & Jackson, 2014). In this study, the scale demonstrated acceptable internal reliability (α = 0.91).

2.3. Procedure

Participants were recruited online and provided a survey link to the survey on the Qualtrics platform. Participants were informed that the study had ethics approval prior to beginning. Approval by the local IRB was obtained and sharing and use of data are not patent. After completion of the questionnaires, participants were reimbursed for their time. All the data was collected in the month of July in 2017.

3. Results

The statistical analysis plan for the data was to check the assumptions, conduct correlation and linear regression analyses with mediation. Table 1 shows the correlations and that the measures had adequate reliability. Relationship satisfaction had a medium correlation with BAS, $r = 0.27$, $p < .004$, BAS-RI, $r = 0.34$, $p < .001$, BAS-GDP, $r = 0.34$, $p < .001$, and BAS-RR, $r = 0.26$, $p < .005$. BIS sensitivity had a medium to strong association with relationship satisfaction, $r = -0.37$, $p < .001$. Relationship satisfaction had no association with BAS-IMP.

Hypothesis 1 was that BAS sensitivity will be positively related to relationship satisfaction. A multiple linear regression showed an increase in BAS sensitivity predicted an increase in relationship satisfaction, $β = 0.29$, $p < .001$, 95% CI [0.23,0.90]. The proportion of variance explained by BAS, BIS and FFFS was 22%. This supports Hypothesis 1.

Hypothesis 2 was that the subcategories of BAS sensitivity will be positively related to relationship satisfaction. A multiple linear regression showed an increase in BAS-RI sensitivity predicted an increase in relationship satisfaction, $β = 0.32$, $p = .005$, 95% CI [0.14,0.73]. Similarly, the multiple linear regression showed an increase in BAS-GDP sensitivity, $β = 0.11$, $p = .305$, 95% [−0.14,0.43] and BAS-RR sensitivity, $β = 0.15$, $p < .207$, 95% [−0.13,0.59] predicted

Table 1

Correlations, means, standard deviations and cronbach alphas of relationship satisfaction and reinforcement sensitivity theory.

Variable	1	2	3	4	5	6	7	8	9
1 Relationship satisfaction									
2 BIS	−0.37***								
3 BAS	.27**	0.04							
4 FFFS	−0.05	0.36***	0.29***						
5 BAS-RI	0.34***	−0.14	0.80***	0.06					
6 BAS-GDP	0.34***	−0.19*	0.63***	0.08	0.43***				
7 BAS-RR	0.26**	0.03	0.87***	0.39***	0.58***	0.47***			
8 BAS-IMP	−0.14	0.38***	0.60***	0.25**	0.36***	−0.06	0.41***		
9 Mastery	0.35***	−0.35***	0.55***	−0.06	0.52***	0.61***	0.38***	0.11	
Mean	4.06	2.22	2.57	2.44	2.60	3.01	2.63	2.07	3.74
Standard deviation	0.83	0.67	0.42	0.71	0.58	0.62	0.54	0.57	0.67
Cronbach's α	0.96	0.95	0.86	0.87	0.95	0.79	0.89	0.84	0.91

Note. BIS = Behavioral Inhibition System; BAS = Behavioral Approach System; BAS-RI = Reward Interest; BAS-GDP = Goal Driven Persistence; BAS-RR = Reward Reactivity; BAS-IMP = Impulsivity.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

relationship satisfaction. However, the multiple linear regression showed BAS-IMP sensitivity negatively predicted relationship satisfaction, $\beta = -0.31$, $p < .003$, 95% $[-0.74, -0.15]$. The proportion of variance explained by BAS-RI, BAS-GDP, BAS-RR, and BAS-IMP was 23%. The results from BAS-RI, BAS-GDP, and BAS-RR support Hypothesis 2.

Hypothesis 3 was that BIS sensitivity will be negatively related to relationship satisfaction. A multiple linear regression model showed an increase in BIS sensitivity predicted a decrease in relationship satisfaction $\beta = -0.38$, $p < .001$, 95% $[-0.68, -0.26]$. The proportion of variance explained by BAS, BIS, and FFFS was 22%. This supports Hypothesis 3. As expected, there was no association between FFFS and relationship satisfaction.

Hypothesis 4 was that the direct relationships in Hypotheses 1 and 2 will be mediated by mastery. Analysis was conducted using the SPSS PROCESS macro using 1000 bootstrap samples (Hayes, 2017). The results indicate mastery mediated BAS and relationship satisfaction with BAS, BAS-RI, and BAS-RR. See Figs. 3, 4, and 5. A significant indirect effect of BAS on relationship satisfaction through mastery, $b = 0.31$, [0.084, 0.601]. Similarly, there was a significant indirect effect of BAS-RI on relationship satisfaction through mastery, $b = 0.18$, [0.005, 0.374]. Likewise, there was a significant indirect effect of BAS-RR on relationship satisfaction through mastery, $b = 0.17$, [0.056, 0.349]. A significant indirect effect of BAS-GDP on relationship satisfaction through mastery was not found, $b = 0.19$, [−0.03, 0.44], although the coefficient was reduced and became non-significant (see Fig. 6). No association was found for BAS-IMP. These results from BAS, BAS-RI, and BAS-RR support Hypothesis 4.

4. Discussion

This study aimed to examine the links between RST and relationship satisfaction via the mediator mastery. Hypothesis 1 was supported as BAS sensitivity positively predicted relationship satisfaction. Hypothesis 2 was partially supported as BAS-RI positively predicted relationship satisfaction and BAS-IMP negatively predicted relationship satisfaction. Hypothesis 3 was supported as BIS sensitivity negatively predicted relationship satisfaction. Hypothesis 4 was mostly supported as the direct relationships in Hypotheses 1 and 2 were mostly mediated by Mastery. Mastery mediated the relationship between BAS, BAS-RI, and BAS-RR with relationship satisfaction. Therefore, links between RST and relationship satisfaction via the mediator mastery are evident.

As expected, Hypothesis 1, BAS will predict relationship satisfaction, was supported. This was a somewhat novel finding as these variables have not been researched together before. However, BAS has been associated with extroversion and a meta-analysis showed high extroversion is a predictor of intimate relationship satisfaction (Malouff et al., 2010). Moreover, extroversion has been shown to have a positive relationship with secure attachment, romantic relationship quality, and positive romantic relationship outcomes (White et al., 2004). Similarly, this result aligns with high BAS associating with secure attachment (Hundt et al., 2013). BAS is a relatively positive neurobiological motivational system of personality and seems to be considerably related to high romantic relationship satisfaction which is positive outcome. Perhaps, individuals with a strong neurobiological drive for approaching rewards put more cognitive effort into a romantic relationship believing it is a goal that will reward them with happiness.

Interestingly, Hypothesis 2, the subcategories for BAS will predict relationship satisfaction, was partially supported. The BAS-RI positively
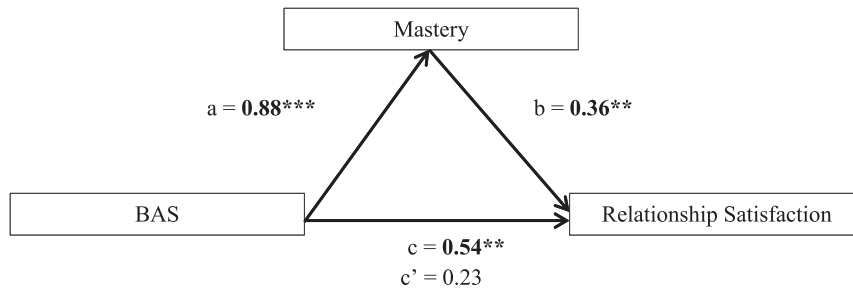
Table 2

Summary of multiple linear regressions analyses for predicting romantic relationships.

DV	IV	b	SE	β	95% CI	t	R^2
Relationship satisfaction	r-BAS	0.56	0.18	0.29	(0.23,0.90)	3.35***	
	r-BIS	−0.47	0.11	−0.38	(−0.68,−.26)	−4.40***	
	r-FFFS	0.01	0.11	0.01	(−2.1,0.23)	0.94	0.22***
	BAS-RI	0.46	0.16	0.32	(0.14,0.77)	2.89**	
	BAS-GDP	0.15	0.14	0.11	(−0.14,0.43)	1.03	
	BAS-RR	0.23	0.18	0.15	(−0.13,0.59)	1.27	
	BAS-IMP	−0.44	0.15	−0.31	(−0.74,−0.15)	−3.01**	.23***

Note. BIS = Behavioral Inhibition System; BAS = Behavioral Approach System; BAS-RI = Reward Interest; BAS-GDP = Goal Driven Persistence; BAS-RR = Reward Reactivity; BAS-IMP = Impulsivity.

** $p < .01$.

*** $p < .001$.

Fig. 3. BAS predicting relationship satisfaction with mediating mastery variable. BAS = Behavioral Approach System. **$p < .01$. ***$p < .001$.

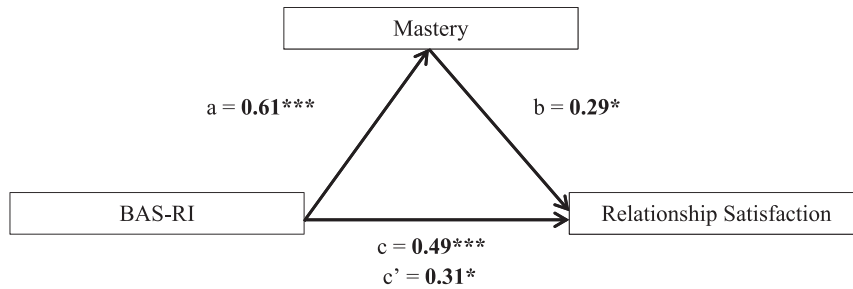**Fig. 4.** BAS-RI predicts relationship satisfaction with mediating mastery variable. BAS-RI = Reward Interest. *$p < .05$. ***$p < .001$.
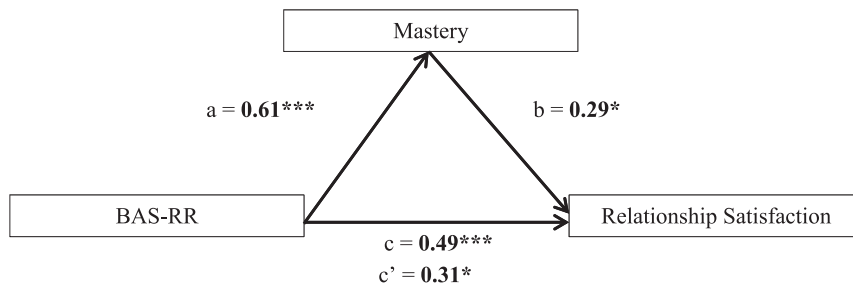

Fig. 5. BAS-RR predicts relationship satisfaction with mediating mastery variable. BAS-RR = Reward Reactivity. *$p < .05$. ***$p < .001$.

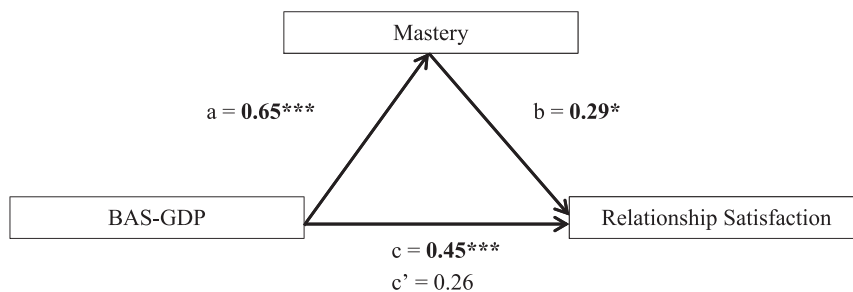**Fig. 6.** BAS-GDP predicts relationship satisfaction with mediating mastery variable. BAS-GDP = Goal Driven Persistence. *$p < .05$. ***$p < .001$.

predicted relationship satisfaction. These findings are consistent with previous research suggesting that an extrovert's greater sensitivity to rewards might be the main factor predicting happiness (Lucas & Diener, 2001). This finding strengthens previous research proposing insight, planning, and control found in BAS-RI relates to a slow lifestyle, which is good for reproduction and survival in stable environments (Krupić et al., 2018). Individuals with high BAS-RI may be inclined to put more cognitive effort into a romantic relationship believing it is an adaptive goal that will reward them with happiness.

Unexpectedly, it was shown that BAS-IMP negatively predicted relationship satisfaction. This result is consistent with separate trait impulsivity research reporting a negative association with romantic relationship satisfaction (Sophia et al., 2009) and a positive association with attachment insecurity (Brewer et al., 2017). However, BAS-IMP is

characterized as rapid responding to optimize one's circumstances which is related to functional impulsivity (Smillie & Jackson, 2006). The present data suggests even functional impulsivity, may be associated with lower relationships satisfaction.

As expected Hypothesis 3, BIS will negatively predict relationship satisfaction, was supported. The direct negative association between BIS and relationship satisfaction is consistent with previous findings as BIS is strongly related to insecure attachment (Jiang & Tiliopoulos, 2014) and low relationship quality and satisfaction, in comparison to securely attached individuals (Sophia et al., 2009). Although, results from Sophia et al. (2009) should be taken with caution as it had a small sample size with a total of 89 participants separated into two groups. Perhaps, individuals with highly active neurobiological conflict systems that produce anxiety, find it hard to approach desired rewards such as a

highly satisfying relationship. This could be because the obstacles to achieving that goal triggers a strong risk of failure and discomfort, and their resources are exhausted by this over-analysis, thus having low mastery and lower relationship satisfaction.

Hypothesis 4 was mostly supported as some of the direct relationships in Hypotheses 1 and 2 were mediated by Mastery. Mastery mediated the relationship between BAS, BAS-RI, and BAS-RR with relationship satisfaction. This finding strengthens previous research proposing mastery is a mediator that re-expresses undirected energy toward functional outcomes and is associated with BAS (Elliot & Thrash, 2010; Reshma & Manjula, 2016). This study's results are consistent with past research indicating benefits to wanting to grow in relationships and improve with effort (Knee et al., 2002).

4.1. Implications

Implications of these findings, from an empirical standpoint, are an advanced understanding of positive and negative romantic relationships via a neurobiological model of personality, via mastery. The knowledge that BAS and mastery are associated with good romantic relationships, and BIS and low mastery facilitate problematic romantic relationships is useful in multitude platforms. From a clinical standpoint, psychologists can help clients increase mastery and BAS sensitivity, which may have a positive flow on effect and improve their romantic relationship satisfaction. It can be incorporated into couples' therapy. Individuals, parents, schools, and workplace can also benefit from this research.

4.2. Strengths and Limitations

The strengths of this study were that it used a discrete sample of individuals only in an exclusive relationship. The study also uses of the most up to date measure of RST that has analysis at the subscale level of BAS. Furthermore, the statistics include mediation using bootstapping. A limitation of the study was its cross-sectional design preventing the determination of causality. Future studies could incorporate a longitudinal or experimental design. Second, this study had self-report measures. Future studies could include behavioral measures to avoid inflating correlations or social desirability.

5. Conclusion

The present study provides evidence to support RST, the neurobiological model of personality, can predict relationship satisfaction, through mastery. The results highlight that the revised BAS and its subcategory RI each predicted relationship satisfaction. Mastery mediated the relationship between BAS, BAS-RI, and BAS-RR with relationship satisfaction. Interestingly, Impulsivity negatively predicted relationship Satisfaction. Also, BIS negatively predicted relationship satisfaction. This research suggests individuals with high reward sensitivity and mastery may put more cognitive effort into a romantic relationship believing it is a goal that will reward them with happiness. Research in this field is necessary because it can serve as a step forward toward increasing healthy enduring romantic love in the world.

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