Unique Associations of Revised-Reinforcement Sensitivity Theory Constructs with Social Anxiety

Abstract

Revised reinforcement sensitivity theory (r-RST) is a major neuropsychological theory of motivation, emotion and personality. We report the results of a study that examined the unique relationships of the r-RST constructs with two forms of anxiety: social interaction social performance. Five hundred and seventy-twoA adults completed the Reinforcement Sensitivity Theory of Personality Questionnaire (RST-PQ) alongside measures of social interaction anxiety and social performance anxiety. Regression results revealed both social interaction anxiety and social performance anxiety were linked uniquely and positively with the behavioral inhibition system (BIS) scale score, as predicted. In addition, social observation anxiety Rapson: is this a 3rd form of anxiety that we have not mention above, where we say we looked at social interaction and performance – perhaps we clarify this as this findings seems to come out of the blue. was associated uniquely ad positively with the fight-flight-freeze system (FFFS) scale score. The theoretical and clinical implications of the findings for social anxiety are discussed.

Keywords: social anxiety; social interaction anxiety; social performance anxiety; revised-reinforcement sensitivity theory; Reinforcement Sensitivity Theory of Personality Questionnaire.

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Introduction

Understanding the complex links between psychological disorders and personality can enhance our understanding of their etiology, course, progress and treatment outcomes (Costa & Widiger, 1994; Markon, Krueger, & Watson, 2005; Nigg et al., 2002; Watson, Clark, & Harkness, 1994; Widiger & Trull, 1992). Social anxiety reflects persistent and over-whelming fear should we be saying that 'anxiety' is 'fear'? arising out of concern that one will say or do something leading to embarrassment or negative peer evaluation in social situations (American Psychiatric Association, APA, 2013). According to Spence and Rapee (2016), social anxiety may be a personality-like construct.

Reinforcement sensitivity theory (RST; Gray, 1982; Gray & McNaughton, 2000; McNaughton & Corr, 2004) is a major neuropsychological model of emotion, motivation and personality and it has gained prominence in explaining various psychological disorders (Bijttebier. Beck, Claes, & Vandereycken, 2009; Harnett, Loxton, & Jackson, 2013). The behavioral inhibition system (BIS) and the behavioral approach system (BAS) were proposed as the major constructs in the original version of this theory or old-RST (o-RST; Gray, 1982). In the revised version of this theory, or r-RST (Gray & McNaughton, 2000; McNaughton & Corr, 2004), the major constructs are the BAS, BIS and fight-flight-freeze system (FFFS). Gray and McNaughton (2000) linked the major personality dimensions in RST to social anxiety, and there is now evidence supporting this, at least for o-RST constructs (e.g., Kimbrel et al., 2016; Kramer & Rodriguez, 2018; Ly & Gomez, 2014). As the FFFS in r-RST is viewed as, somewhat, mapping onto BIS in o-RST, and as the BIS in r-RST is not entirely comparable to the BIS in o-

RST (Corr, 2008), it is now not clear how the r-RST constructs, in particular, the BIS and FFFFS, are associated with social anxiety. Exploration of this empirical gap in the research literature would have theoretical and clinical implications for social anxiety. Accordingly, the major aim of the current study was to examine how the r-RST constructs are uniquely associated with social anxiety. Rapson, or should we say different aspects of social anxiety as we have presented three in the Abstract – we could list them here

Reinforcement Sensitivity Theory

he BIS and BAS in o-RST (Gray, 1982) are neurobiological systems. The BIS activation was related to individual differences in the sensitivity to conditioned stimuli relating to punishment, frustrative non-reward and novelty, and was postulated to produce passive avoidant behaviors and contribute to the generation of anxiety. In contrast, BAS activation was related to individual differences in sensitivity to non-punishment and reward, and was associated with approach behaviors and positive emotions depending on the specifics of the situation (e.g., hope in pursuing an appetitive stimulus and pleasure on obtaining it).

In the revised RST model (r-RST; Gray & McNaughton, 2000; see also McNaughton & Corr, 2004; Corr, 2008), the BAS is comparable to the BAS in o-RST. It functions to move the individual towards the final (typically biological) reinforcer, with the individual continuously identifying, planning, and executing responses to allow temporal and spatial movement towards the reinforcer. Reward interest, goal planning, and drive-persistence are assumed to constitute early stages of approach motivation, with the individual experiencing anticipatory pleasure and 'micro-reward' along the path as approach sub-goals are achieved. Reward responsivity and impulsivity are assumed to constitute later stages of approach behavior, with the individual experiencing pleasure. Whilst still linked to anxiety the BIS in r-RST no longer relates to

mediating reactions to punishing stimuli per se; instead, it is related to detection and resolution of goal conflicts, especially onesentailing approach-avoidance (involving the BAS and FFFS activations, respectively). Upon the BIS activation, prepotent conflicting behaviors are inhibited, whilst attention and arousal are increased. Conflicts are resolved by increasing the negative valence of stimuli – which serves to trigger the FFFS - leading to an outcome that favors either an approach response when it is perceived that the danger has diminished (mediated by the BAS) or an active avoidance or escape response when it is perceived that the danger is present or increased (mediated by the FFFS). Emotionally, BIS activation results in rumination about the past, worry about the futures, and general concern and anxiety about likely risk. Cognitively, it generates obsessional cognitions about the likelihood of an unpleasant incident happening, should the danger not be avoided. Behaviorally, it leads to disengagement when the danger is considered to be unavoidable. In r-RST, responses to various aspects of punishing stimuli are conceptualized as being influenced by the third system, the FFFS. This system is associated to reactions to all types of punishment, and as such it is viewed as somewhat mapping onto BIS in o-RST (Kimbrel (2008) which was said to be sensitive to *conditioned* stimuli of punishment (the o-RST Fight-Flight System, FFS, was said to to active to *unconditioned* punishing stimuli that required an immediate response). In r-RST, a distinction is made between avoidable punishment, and punishment that cannot be avoided. The former is assigned to the FFFS. Emotionally, FFFS activation results in fear; behaviorally, it leads to defensive behaviors, such as flight, escape, and active avoidance when the punishment can be avoided, or fight and freeze when the punishment is more proximal and less easy to avoid.

Questionnaires Developed for Measuring r-RST Constructs

To date, at least three different questionnaires for use with adults have been developed to

measure RST constructs reflected in r-RST (Corr, 2016). They include the Jackson-5 (Jackson, 2009), the Reinforcement Sensitivity Questionnaire (RSQ; Smederevac, Mitrovic, Colovic, & Nikolasevic, 2014), and the Reinforcement Sensitivity Theory of Personality Questionnaire (RST-PQ; Corr & Cooper, 2016). Should we not mention too the German one too? Both Jackson-5 and the RSQ have scales for the r-RST constructs of the BAS, BIS, Fight, Flight, and Freeze. Contrary to existing empirical and theoretical evidence, both these questionnaires do not provide a multidimensional structure of the BAS (Corr, 2016). Also, many of the BIS items in these questionnaires lack face validity and are conceptually and statistically related to the BAS (Corr, 2016; Kramer et al., 2015). In contrast, the RST-PQ has scales for the FFFS, the BIS, and four aspects of the BAS (which is unique among the r-RST questionnaires). Given that the RST-PQ was utilized in the current studies for examining r-RST personality conceptualizations, we provide a more in-depth description of this measure below.

The RST-PQ has 65 self-rated items. Its development was theoretically motivated to measure the specific components of r-RST (Corr & Cooper, 2016). Corresponding to r-RST, it has scales to assess the FFFS constructs, the BIS, and the BAS. The FFFS scale is unidimensional, and includes items covering freeze, flight, and active avoidance/escape. Pointing out that it was difficult to measure fight cleanly by human personality questionnaires, because it has been found to be negatively linked to the BIS components, and positively with the BAS (Reuter, Cooper, Smillie, Markett, & Montag, 2015), Corr and Cooper (2016) did not include defensive fight items as part of the FFFS. They offered a separate measure for this, called Defensive Fight (see also Corr, 2016).

In the RST-PQ, the BIS scale is unidimensional, and includes items for worry, motor planning interruption, behavioral disengagement and obsessional thoughts. The BAS scale is

multidimensional, with four subscales: Reward Interest (processes which relate to openness to new experiences and opportunities which may yield reward); Goal-Drive Persistence (elevated motivation and maintenance of motivation to in order to attain long-term goals); Reward Reactivity (positive emotional responses to attained rewards); and Impulsivity (processes involve prompt and spontanous behavioural change in order to 'grab' a reward). Structurally, therefore, the RST-PQ is a six-factor model. EFA and CFA have confirmed this six-factor model, and there is adequate evidence supporting the convergent and discriminant validities, and reliabilities of its factors. Its structure has also been replicated in other countries and languages (e.g., Pugnaghi, Cooper, Ettinger, & Corr, 2018). Arguing that the RST-PQ has sound conceptual, theoretical and psychometric qualities, Corr and Cooper (2016) have offered it as a useful questionnaire for r-RST personality research, which includes exploration of how various psychopathologies are related to the r-RST constructs.

Social Anxiety and Social Anxiety Disorder Rapson – where does social observation anxiety fit in?

Social anxiety refers to over-whelming fear that one's actions in social settings would result in negative peer evaluation (APA, 2013). Extreme levels causing maladjustment is considered a disorder, called social anxiety disorder (SAD; APA, 2013; Spence & Rapee, 2016) and this is a highly heterogeneous disorder (Hofmann, Heinrichs, & Moscovitch, 2004). Although there is some support for a dimensional view of social anxiety (Furmark, Tillfors, Stattin, Ekselius, & Fredrikson, 2000), it is generally accepted that there a type that is characterized by fear from direct most social ?? interaction situations, and a type that is characterized by fear of one or two social settings, such as performing in public (Bögels et al., 2010; Cox et al., 2008). These two types are sometimes referred to as *social interaction anxiety*

and *social performance/observation anxiety*, Rapson – I see now they are related which is causing my confusion above – I think we need to clarify this at throughoutrespectively (Mattick & Clarke, 1998). These different types are assumed to be categorically Rapson: meaning – could we say how? distinct (Kodal et al., 2017).

Unique Relationships of r-RST Constructs with Social Anxiety

To date, at least four studies have examined the relationships of r-RST constructs, as measured by questionnaires,with social anxiety (Fayazi & Hasani, 2017; Kramer, Rodriguez, & Kertz, 2015; Kramer & Rodriguez, 2018; Randjelovic and Zeleskov-Djoric, 2017). The two studies by Kramer and associates used the Jackson-5, and the study by Randjelovic and Zeleskov-Djoric used the RSQ. Associations in these studies involving the Jackson-5 have been reported in terms of correlations and multiple regression coefficients. Statistically, correlations do not indicate unique association, whereas multiple regression coefficients did. Based on multiple regression coefficients, for the r-RST constructs in Jackson-5, Kramer and Rodriguez (2018) found that social interaction anxiety was linked uniquely and positively with BIS and FFFS-Freeze, and uniquely and negatively with the BAS. However the associations involving the BIS and FFFS were stronger than the associations involving the BAS. In contrast, social performance anxiety was associated uniquely and positively with the BIS and FFFS-Freeze, Fight and Flight, but there was no association with the BAS. Fayazi and Hasani (2017) found that for overall social anxiety, there were unique positive associations with all three FFFS dimensions (flight, fight, and freeze), unique negative association with the BAS, and no association with the BIS. Kramer et al. (2015) found that in a logistic regression, Freeze and the BAS were unique significant predictors of group membership.

Taken together, these findings from studies using Jackson-5 (albeit from limited studies),

are conflicting. Evidence indicate positive associations for all forms of social anxiety (social observation anxiety and social interaction anxiety) with the FFFS (in particular Freeze). The findings for the BIS are inconsistent with results showing a negative association and no association with social anxiety. Where a relationship has been shown, the strength of this relationship is lower compared to the relationship involving the FFFS and social anxiety. The findings for the BAS are also inconsistent with results showing negative association and no association with social anxiety. It is speculated here that the conflicting findings in past studies in this area may be related to poor psychometric qualities of the Jackson-5 and problematic structure (Corr, 2016). Specifically,the BIS items in these questionnaires lack face validity and seem to reflect BAS features, and statistical relations confirm this view.. Given this conceptual and empirical confusion, there is an obvious need for studies in this area using more valid measures of r-RST. Given the sound conceptual, theoretical and psychometric qualities of the RST-PQ and Defensive Fight questionnaire (Corr &Cooper,2016), it is conceivable that they could provide a clearer and more meaningful understanding of the relationships of the r-RST constructs and social anxiety (Kramer & Rodriguez, 2018). Additionally, as the RST-PQ provides a multidimensional structure of the BAS (with subscales for Reward Interest, Goal-Drive Persistence, Reward Reactivity, and Impulsivity), the use of the RST-PQ would provide a more comprehensive understanding of BAS processes involved social anxiety – something which to date has been under-examined.

Aims of the Current Study

The present study used multiple regression analyses to determine how r-RST constructs as presented in the RST-PQ and Defensive Fight Scale are *uniquely* related to social anxiety. Given support for categorically distinct social interaction anxiety and social performance anxiety

types (Kodal et al., 2017), these relations were examined separately for social interaction anxiety and social performance anxiety. It was hypothesized that both social observation anxiety and social interaction anxiety would be predicted positively by FFFS and BIS constructs, with more variance being explained by the FFFS. Additionally, we expected that one or more of the BAS constructs (Reward Interest, Goal-Drive Persistence, Reward Reactivity, and Impulsivity) would predict social interaction anxiety negatively.

Methods

Participants

Participants were recruited online from the community via a SurveyMonkey link. They were not deliberately solicited as part of the recruitment Rapson – not sure what this means, as surely there were deliberately solicited as how else could they participate?!

, and there was no restriction on age for participation. The final study-group (N = 572) included 422 females (73.8%) and 150 males (26.2%). Age varied from 18 to 79 years (M = 23.98, SD = 8.21). The mean (SD) age for males and females were 23.33 (7.30) years and 24.22 (8.52) years, respectively. Genders did not vary significantly by age, t (df = 570) = 1.14, p = 0.11. Rapson – as I get older I do start to wonder whether the whole of psychology as not been skewed – or should it be screwed – by using young people!!

In regards to educational attainment, 43.3% completed secondary school, 35.3% an undergraduate university degree, 10.5% a postgraduate university degree, 9.6% trade/technical school, and 1.4% did not report relevant information. In relation to marital status, 57.4% were single, 39.5% reported being in a relationship or married, 1.6% were divorced, separated, or widowed, and 1.6% did not report relevant information. With regards to their employment,

38.6% reported being employed part-time, 35.1% reported being students, 14.8% were working full-time, 7.9% were unemployed, 0.7% was retired, and 1.9% did not provide this information.

Measures

Social Interaction Anxiety Scale (SIAS) and the Social Phobia Scale (SPS) Short Forms (Peters, Sunderland, Andrews, Rapee, & Mattick, 2012). Mattick and Clarke (1998) introduced the Social Interaction Anxiety Scale (SIAS) and the Social Phobia Scales (SPS) which are commonly employed as self-report dimensional tools to assess social interaction anxiety and social performance/observation anxiety, respectively. Peters et al. (2012) introduced a shorter six-item edition of the SIAS and SPS (PSIAS/SPS-SF). An example of an SIAS is "*I tense up if I meet an acquaintance on the street*"; and an example of an SPS item is "I *would get tense if I had to sit facing other people on a bus or train".* In both questionnaires, each item is scored across five-points (0=*not at all,* to 4=*extremely*), where higher scores reflect higher social anxiety. Both scales have demonstrated adequate reliability and validity, and diagnostic and treatment sensitivities (Peters et al., 2012). This study used the total scores from the Peters et al. (2012) short forms of the SIAS and SPS as indices of social interaction anxiety and social performance anxiety, respectively. Cronbach's alpha values for the social interaction anxiety, and social phobia scales in the current study were .85 and .91, respectively. According to Peters et al. (2012), the optimum cut-off points for discerning individuals with and without social anxiety disorder is 7 or higher for the short SIAS scale and is 2 or higher for the short SPS. In the current study, 17.2% of individuals had scores at or above these cut-off points.

Reinforcement Sensitivity Theory - Personality Questionnaire (RST-PQ; Corr & Cooper, 2016). The RST-PQ was developed specifically to measure the r-RST constructs and it contains scales for FFFS (10 items), BIS (23 items), and four BAS subscales: Reward Interest (7

items), Goal-Drive Persistence (7 items), Reward Reactivity (10 items), and Impulsivity (8 items) – it also includes an independent scale for Defensive Fight (8 items; Corr & Cooper, 2016). Together there are 73 items. Every question is scored across four points, ranging from 1 (*not at all*) to 4 (*highly*). In the initial development and validation study, Cronbach's alpha values were acceptable: FFFS =.78, BIS = .93, BAS-Reward Interest =.75, BAS-Goal-Drive Persistence = 86, BAS-Reward Reactivity = .78, BAS-Impulsivity = .74. For the current study, values were comparable: FFFS =.79, BIS = .91, BAS-Reward Interest =.74, BAS-Goal-Drive Persistence = 87, BAS-Reward Reactivity = .75, BAS-Impulsivity = .75.

Procedure

Respondents or 'participants', as used elsewhere? were recruited online, via SurveyMonkey. Needed as we have already said above. Ethics approval was granted by the institution's Human Research Ethics Committee. Details of the study and participation were posted on notice boards around the University. Respondents were given an information statement before their recruitment which informed them that completing the questionnaires signified their understanding of the research process and their consent to be involved in the study. All questionnaires were completed anonymously.

Statistical Analyses

Initially, the correlations of the RST-PQ scale scores (FFFS, BIS, BAS-Reward Interest, BAS-Goal-Drive Persistence, BAS-Reward Reactivity, and BAS-Impulsivity), the scores for Defensive Fight, and the PSIAS/SPS-SF scale scores (SIAS and SPS) were computed. As our goal was to investigate the unique associations of the RST-PQ constructs with the social interaction anxiety and social performance anxiety as measured by the PSIAS/SPS-SF, our main analyses involved a sequence of multiple linear regression models. In these analyses, the total

scores for SIAS and SPS were regressed on all the individual total scores of the RST-PQ constructs (including Defensive Fight) simultaneously. As social anxiety is more common amongst women (Asher, Asnaani, & Aderka, 2017), and there was wide age-variability in respondents examined (ranging from 18 years to 79 years), the effects of age and gender on these associations were controlled by entering these variables as covariates in these analyses. Rapson, was this in Step/Block 1, or simultaneously with all variables? As there were nine predictors in each analysis, the *p* value for inferring significance was adjusted to control for Type 1 error. The adjustment involved Bonferroni correction (Mundform, Perrett, Schaffer, Piccone, & Roozeboom, 2006), and this value was $p < .0055$ (i.e., .05/9). Rapson – I have not seen this adjustment in multiple regression before, but maybe it should be used. I know the adjusted R deals with number of variables issue. Additionally, to test for statistical difference between the standardized beta values for pairs of significant predictors in the same model, corresponding 95% confidence intervals were computed with SPSS, using the bias corrected bootstrap option (with 1,000 re-samples) in the regression analysis module. As proposed by Cumming (2009), difference was inferred if their corresponding confidence intervals overlapped by less than 50%. I did not know this existed – we live and learn!

Results

Table 1 provides the mean and standard deviation (*SD*) scores of the variables and the correlations of the RST-PQ scale scores (FFFS, BIS, BAS-Reward Interest, BAS-Goal-Drive Persistence, BAS-Reward Reactivity, and BAS-Impulsivity) and the Defensive Fight scale score, with the PSIAS/SPS-SF scale scores (SIAS and SPS). Table 2 shows the standardized beta values of the multiple regressions, in which the total scores for SIAS and SPS were regressed on

all the RST-PQ constructs (including Defensive Fight) simultaneously, with age and gender as covariates.

As shown in Table 2, for the *p* value set for inferring statistical significance (< .0055), seem VERY conservative to me both the SIAS and SPS were predicted significantly and positively by the BIS. In addition, SPS was predicted significantly and positively by FFFS. Although details are not provided here, as can be deduced from Table 2, within each model the standardized beta values for the BIS were significantly higher than the beta values of all other significant predictors, with the latter predictors not showing differences between them (based on Cumming [2009] guideline for interpreting such difference). Additionally, based on the formula recommended by Paternoster, Brame, Mazerolle, and Piquero (1998), there was no significant difference between the beta values for SIAS and SPS with BIS ($z = 0.784$, *ns*).

Discussion

The study examined the relevance of r-RST scales, as assessed by the RST-PQ the Defensive Fight scale, for social anxiety. The findings showed that social interaction anxiety was positively and uniquely associated with the BIS. Social performance anxiety was positively and uniquely associated with the BIS and FFFS, with the BIS having stronger association than the FFFS. The strength of the associations of the BIS with social interaction anxiety and social performance anxiety were comparable. The BAS scales (Reward Interest, Goal-Drive Persistence, Reward Reactivity, and Impulsivity) were not associated with either social interaction anxiety or social performance anxiety.

While some of our findings are consistent with existing data that have examined the unique relations of r-RST constructs in Jackson-5 with social anxiety (Fayazi & Hasani, 2017; Kramer et al., 2015; Kramer & Rodriguez, 2018), there are also findings that are not consistent

with the current results. The findings across these studies show positive unique associations for both social observation anxiety and social interaction anxiety with the FFFS. The findings for the BIS have been inconsistent with results showing a negative association and no association with social anxiety. Where a relationship has been shown, the strength of this relationship is lower for the BIS compared to the relationship involving the FFFS and social anxiety. Past findings for the BAS have shown negative association and no association with social anxiety. It is suggested here that the differences in the findings in this and previous studies may be related to the questionnaires used to measure r-RST constructs. While past studies have used the Jackson-5, the current study used the RST-PQ. These r-RST questionnaires are distinct (Corr, 2016). In this respect, as the BIS items in the Jackson-5 measure lack face validity and are conceptually and statistically related to the BAS. As the RST-PQ was developed on the basis of sound conceptual, theoretical and psychometric qualities, the findings in the current study are likely to reflect a clearer and more meaningful understanding of the relationships of the r-RST constructs with social anxiety.

Theoretical and Treatment Implications

Given our findings for the BIS, and the theoretical and conceptual characteristics of the BIS, it follows that high social anxiety (both social interaction anxiety and social observation anxiety) will be linked with resolving the social conflicts being experienced by either an approach response when it is perceived that the social conflict experienced is low, or an active avoidance or escape response when it is perceived that the social conflict experienced is high. Additionally, high social anxiety will be associated with high anxiety, worry and concern considering likely risk, obsessional cognitions about the likelihood that an imminent unpleasant event, if the risk is inevitable, and disengagement otherwise. It is speculated that for resolving a

conflict, r-BIS stops current behavior, thereby resulting in behavioral inhibition. Also, it results in hyperarousal and anxiety, and directs focus on the potential danger by increasing information and attention processing of the danger (Corr, 2013). In this respect, the heightened FFFS associated with social observation anxiety would mean that responses are more likely to be emotional fear, leading to defensive behaviors, such as flight and active avoidance, rather than defensive approach, such as fight. Overall, the link of social anxiety and BIS (in terms of experiencing high arousal and anxiety) has been shown to lead to a bias for avoidance responses that is fueled by heightened FFFS sensitivity.

Other findings and implications worthy of note are as follows. First, the heightened FFFS sensitivity associated with social observation anxiety could mean that social anxiety responses are more likely to be emotional fear, leading to defensive behaviors, such as flight and active avoidance, rather than defensive approach, such as fight. Second, as we found that the association involving the BIS with social anxiety was significantly greater than the association involving FFFS with social anxiety, it follows that heightened sensitivity of the BIS plays a more dominant role than heightened FFFS sensitivity in predicting social anxiety. Third, as we found that the strength of the links for the BIS with social interaction anxiety and social observation anxiety were comparable, it follows that the BIS has comparable influence (in terms of strength of associations) with both social interaction anxiety and social observation anxiety. Fourth, our results have treatment implications. Viewed from the r-RST perspective, our findings indicate that treatment of social anxiety needs to focus on processes that contribute to reduction of arousal and anxiety that facilitates resolving approach-avoidance conflict behaviours, and fear reduction, such as exposure, cognitive restructuring, social skills training, applied relaxation. Indeed, many treatment approaches that are considered successful for social anxiety include

these components(Acarturk, Cuijpers, van Straten, & de Graaf, 2009; Rodebaugh, Holaway, & Heimberg, 2004). Our findings strengthen the call for the refinement of such treatment strategies.

Conclusion, Limitations & Further Research

Our findings point to unique relations for the BIS and FFFS with social anxiety, with the BIS having stronger association than the FFFS. Indeed, social performance anxiety was not associated with the FFFS. Additionally, we did not find association for the BAS with social anxiety. However, our findings and interpretation need to be seen with several limitations in mind. Firstly, it is likely that the results were influenced by common method variance as all measures involved self-ratings. Secondly, the findings only show association and not causal relations as this was a cross-sectional examination. Thirdly, as the respondents were recruited from the community, the findings should be carefully related to clinical populations. Fourthly, as the FFFS in the RST-PQ was unidimensional, it was not possible to clearly establish what FFFS component(s) (fight, fear of freeze) was/were associated with social anxiety. In spite of these limitations, the findings of our research support the notion that major personality constructs in r-RST are, indeed, relevant for understanding social anxiety and that the specific results have major theoretical and clinical implications for social anxiety.

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Table 1

Descriptive Statistics and Correlations of the r-RST Constructs in the Reinforcement Sensitivity Theory of Personality Questionnaire with the Social Phobia Scale and Social Interaction Anxiety Scale Short Forms

		Correlation (N =572, df = 570)	
Variable	Mean (*SD*)	SIAS	SPS
SIAS	10.03 (5.69)		
SPS	9.31 (6.97)		
Gender	-	.12***	.14**
Age	23.98 (8.23)	-.18***	-.20***
FFFS	23.97 (6.48)	.33***	.36***
Defensive Fight	22.48 (4.79)	-.16***	.03
BIS	68.10 (14.57)	.65***	.62***
BAS			
Reward Interest	16.53 (4.61)	-.35**	-.24***
Goal-Drive Persistence	19.60 (4.77)	-.29***	-.20***
Reward Reactivity	27.00 (5.74)	-.14**	-.04
Impulsivity	18.04 (4.87)	-.07	-.01

Note: SIAS = Social Interaction Anxiety Scale; SPS = Social Phobia Scale; FFFS = Fight–Flight–Freeze System; BIS = Behavioral Inhibition System; BAS = Behavioral Approach System. For gender, male = 1, female = 2.

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

Table 2

Standardized Beta Values and Corresponding Statistics Based on Bias Corrected Bootstrap for the Multiple Regression Analyses of Social Interaction Anxiety Scale, and Social Phobia Scale on Age, Gender and the Constructs in the Reinforcement Sensitivity Theory of Personality Questionnaire (Including Defensive Fight)

	Standardized Values for SIAS				Standardized Values for SPS			
Variable	Beta	SE	*p*	95% CI	Beta	SE	*p*	95% CI
Age	-.06	.031	.0689	[-.128, .001]	-.10	.033	.0090	[-.168, -.038]
Gender	-.03	.033	.3506	[-.092, .030]	-.00	.035	.9500	[-.067, .062]
FFFS	.10	.037	.0110	[.029, .164]	.14*	.040	.0020	[.062, .226]
Defensive Fight	-.09	.033	.0140	[-.170, -.023]	.01	.036	.7023	[-.055, .090]
BIS	.58*	.035	.0010	[.506, .652]	.54*	.038	.0010	[.462, .605]
BAS								
Reward Interest	-.09	.040	.0430	[-.167, -.002]	-.02	.043	.7023	[-.113, .082]
Goal-Drive Persistence	-.11	.038	.0080	[-.194, -.036]	-.09	.041	.0370	[-.169, -.002]
Reward Reactivity	-.05	.037	.2537	[-.124, .029]	-.02	.040	.5874	[-.100, .053]
Impulsivity	-.02	.037	.5684	[-.101, .061]	-.02	.039	.5514	[-.094, .056]

Note: SE = standard error; CI = confidence interval; SIAS = Social Interaction Anxiety Scale; SPS = Social Phobia Scale; FFFS = Fight–Flight–Freeze System; BIS = Behavioral Inhibition System; BAS = Behavioral Approach System. For gender, male = 1, female = 2.

* are predictors with *p* values below the level set ($p < .0055$) for inferring statistical significance to control for Type 1 error.