

## **A reinforcement sensitivity theory explanation of antisocial behaviour**

### **Highlights**

- There are sex differences in the link between personality and antisocial behaviour
- In males goal-directed traits and financial strains relate to antisocial behaviour
- In females impulsivity traits and relational strains relate to antisocial behaviour

### **Abstract**

A comprehensive theory of antisocial behaviour (ASB) should focus on both individual differences and life events as potential predisposing factors. The current studies investigate the relative influence of both personality and life strains for males and females' propensity to engage in ASB. We use the Reinforcement Sensitivity Theory (RST) of personality to investigate the extent to which dispositional approach and avoidance behaviours lead to ASB. In the first study, 287 participants reported their engagement in ASB and completed the RST Personality Questionnaire (RSTPQ). In the second study, a new sample of 282 participants completed the same measures as well as reporting the extent to which they had experienced life strains. Results from both studies showed that male participants had associations between goal-directedness and ASB, whilst female participants had more associations between impulsivity and ASB. In Study 2, life strains explained further variance in ASB but also diverged by sex, with males showing a stronger relationship between financial strains and ASB and females having a more notable association between ASB and relational strains. Overall, the results suggest that ASB is more likely in males with an instrumental purpose and in females who are most reactive to personal life events.

**Keywords:** reinforcement sensitivity theory; antisocial behaviour; adolescence; emerging adulthood

In order to understand, prevent and deter antisocial behaviour, we need to develop a more comprehensive understanding of the individual differences involved in the choice to engage in antisocial activities. Antisocial behaviour peaks in adolescence and for many individuals this is a relatively benign and short-lived stage in the transition to adulthood (Moffitt, 1993, 2006). Many adolescents engage in activities that could be considered antisocial; in fact, 74% of people self-report committing at least one 'microcrime' (a very minor offence) in their life (YouGov, 2016). Given that it is 'normal' to engage in limited antisocial behaviour (particularly in adolescence) and rare to engage in none or much, normative models of understanding individual differences, such as personality, could help understand the psychology behind antisocial acts. One such theory, that encompasses key risk factor traits of impulsivity, self-control and goal persistence, is the Reinforcement Sensitivity Theory of Personality.

Reinforcement Sensitivity Theory (RST) is a prominent neuropsychological theory of personality in terms of emotion, motivation, and learning (Corr, 2008). RST is rooted in the assumption that underpinning all major personality traits are basic systems of approach and avoidance motivation (Corr, DeYoung, & McNaughton, 2013). People can approach or avoid potential consequences and it is this tendency to approach and avoid (or do nothing) which manifests as the characteristic patterns of cognition and behaviour which we refer to as personality (Corr, 2015). As detailed by Corr and Krupić (2017), individuals construct their own approach and avoidance related goals and this shapes the nature of the reinforcement they receive. RST describes a behavioural approach system (BAS), defined as being sensitive

to conditioned appetitive stimuli and motivated goal-directed approach behaviours. The main function of this system is to move an organism along a spatio-temporal gradient towards a final biological reinforcer. In order to achieve this goal, there are a number of distinct but related BAS processes: “Reward Interest” and “Goal-Drive persistence” characterize the early stages of approach and these factors can be distinguished from “Reward Reactivity” and “Impulsivity” which are concerned with processes closer to the final reinforcer (Corr & Cooper, 2016). Activation of the BAS is said to lead to the experience of hopeful excitement, drive persistence to reach desired goals, and elation when they have been attained.

The Fight-Flight-Freeze System (FFFS) mediates reactions to all aversive stimuli (conditioned or otherwise), leading to avoidance and escape behaviours. A third system, the behavioural inhibition system (BIS), is responsive to goal-conflict (e.g., equal activation of the FFFS and BAS - or, indeed, goal conflict of any kind with sufficient motivational intensity) and it motivates passive avoidance behaviour. As such, the BIS is responsible for detecting and resolving conflict, rather than simply being sensitive to punishing stimuli, and contributes to risk assessment and potentially to rumination, which can result in the experience of anxiety. This RST structure is now widely recognized, in conceptual and psychometrical terms (Corr, 2011; Gray & McNaughton, 2000; Perkins, Kemp, & Corr, 2007; for review, see Corr, 2016; Corr & Cooper, 2016).

The RST is of interest given evidence that personality factors described in the theory can predispose to ASB. Impulsivity has consistently been implicated in adolescent ASB (Maneiro, Gómez-Fraguela, Cutrín, & Romero, 2016) and is also encompassed in the construct of sensation seeking – the tendency to desire and actively seek out novel and

intensely stimulating experiences and the willingness to take risks for the sake of these (Zuckerman, 1994). A large body of research has suggested that high levels of sensation seeking may be a risk factor for criminal and antisocial behaviours in student, community and convicted samples (Gomà-i-Freixanet, 1995; Hansen & Breivik, 2001; Horvath & Zuckerman, 1993; Pfefferbaum & Wood, 1994; Zuckerman, 2007). Sensation seeking tends to peak in adolescence and is thought to be one reason why so many individuals engage in risky behaviours, including ASB, at this age (Zuckerman, 2007). Other personality traits associated with ASB are lower than average levels of social competence (Palmer & Hollin, 1999), empathy (Jolliffe & Farrington, 2007; Cohen & Strayer, 1996) and emotional and physical self-regulation (Eisenberg et al., 1996; Gottfredson & Hirschi, 1990; Moffitt et al., 2011). Accordingly, antisocial individuals have been shown to score less highly on measures of related constructs such as ability - (Brackett, Mayer, & Warner, 2004) and trait-Emotional Intelligence (Bacon et al., 2014), though the latter study reported this only for males.

There is very little research that has explored the contribution of RST factors to engagement in ASB. In one study, Morgan et al. (2014) indicated heightened BAS and lowered BIS in a sample of male antisocial adolescents, compared to non-offenders. These findings present a useful insight into motivational drives towards ASB. However, Morgan et al. used an RST measure which assesses personality according to the original conceptualisation of the theory and which focusses only on the BIS and BAS (Carver & White, 1994). As such, their results do not take into account the most recent developments in RST. In the present studies, we employ a contemporary and more comprehensive psychometric approach that differentiates FFFS and BIS, as well as providing a more nuanced conceptualisation and measurement of the BAS in terms of the subscales described

above (Corr & Cooper, 2016). In addition, Morgan et al.'s (2014) study comprised only male participants. Males typically report higher levels of ASB than females especially for more criminal and violent activities than females, although the sex gap narrows with minor offences. Males also score more highly on measures of sensation seeking (Zuckerman, 1994, 2007). In the present research, we explore possible sex-differences in the RST-ASB associations.

## Study 1

In Study 1, our aim was to examine the relationship between ASB in adolescence and emerging adulthood and personality traits assessed within the revised RST framework. In line with what is known about personality and ASB, we predicted a positive association between levels of ASB and Impulsivity for both males and females. Given Morgan et al.'s (2014) study, we expected to observe a similar association with at least some aspects of BAS, and negative relationships with BIS, though we made no *a priori* predictions about sex-differences.

## Method

### *Participants*

Two hundred and eighty-seven undergraduates participated in return for course credit: 169 females ( $M^{age} = 20.66, SD = 2.44$ ) and 118 males ( $M^{age} = 20.29, SD = 2.12, p = .21, d = .16$ ).

### *Materials and procedures*

All participants completed the following measures presented online via the Survey Monkey platform.

*Antisocial behaviour:* We presented a list of 35 behaviours and participants were asked to respond yes to any they had engaged in since age 12. Items ranged across non-illegal but undesirable behaviours such as cheating in an exam, interpersonal behaviours such as bullying, relatively minor criminal offences such as using public transport without a ticket to more serious offences such as assault. This method has been used in previous published research on ASB (Bacon et al, 2014; Bacon, Lenton-Maughan & May, 2017). Scores were obtained by summing the yes responses to provide an overall ASB score which presented good reliability ( $\alpha = .88$ ).

*Reinforcement Sensitivity Theory of Personality Questionnaire (RST-PQ, Corr & Cooper, 2016).* This 65-item scale measures three major systems: Fight/Flight/Fear System (FFFS; e.g., “*I am the sort of person who easily freezes-up when scared*”); Behavioural Inhibition System (BIS; e.g., “*When trying to make a decision, I find myself constantly chewing it over*”); and four Behavioural Approach System (BAS) factors: Reward Interest (e.g., “*I regularly try new activities just to see if I enjoy them*”); Goal-Drive Persistence (e.g., “*I am very persistent in achieving my goals*”); Reward Reactivity (e.g., “*I get a special thrill when I am praised for something I’ve done well*”); and impulsivity (e.g., “*I find myself doing things on the spur of the moment*”). Participants respond on a scale from 1 (not at all) to 5 (highly). The RST-PQ scales presented good internal reliability with the present sample: FFFS = .79; BIS = .94; BAS Reward Interest = .79; BAS Goal-Drive Persistence = .87; BAS Reward Reactivity = .81; BAS Impulsivity = .70.

*Social Economic Status (SES)*: We collected family background SES as a control measure. Participants were shown a list of six occupational levels based on the NRS social grades, a system of demographic classification used in the UK for market research purposes (Market Research Society, 2016). The SES levels were coded from 1 (long-term unemployed for whatever reason) to 6 (professional occupations). Participants were asked to indicate which best reflected the home where they grew up and as such, higher score suggested a higher family SES.

## Results

Table 1 presents descriptive statistics for males and females. The reported SES for males ( $M = 3.82$ ,  $SD = 1.86$ ) and females ( $M = 3.94$ ,  $SD = 1.76$ ) did not differ ( $p = .42$ ,  $d = .07$ ).

PLEASE INSERT TABLE 1 ABOUT HERE

As Table 1 shows, males reported a higher level of ASB and Impulsivity than females. Females scored more highly on BAS scales Goal-Drive Persistence and Reward Reactivity, and also on the FFFS. Table 2 presents partial correlations between measures, controlling for SES.

PLEASE INSERT TABLE 2 ABOUT HERE

The largest correlation between the RST-PQ and Antisocial Behaviour (ASB) was in the relationship between BAS-Impulsivity and ASB which fits with extant literature suggesting that spontaneity and poor planning of behaviour relates to antisocial conduct.

Males further showed similar correlations between ASB and Reward Interest, Goal-Drive Persistence and BIS. Females presented a negative association between ASB and Goal-Drive Persistence but no other significant effects. As Table 2 shows, using Fishers' *Z*' tests for the difference in two correlation sizes, we find notable differences in the sexes when looking at the relationships between ASB and both BAS-Goal-Drive Persistence and Reward Reactivity. For female participants, low goal-driven behaviour was associated with more ASB. For male participants we found the opposite. It is also noteworthy that male participants showed a positive correlation between short-term Reward Reactivity and ASB (this correlation was significantly larger than for female participants). These results would suggest that, for female participants, ASB is a product of impulsivity and poor long-term planning, whereas for male participants, ASB may be a reward-focused strategic behaviour.

We conducted a linear regression analysis on ASB for males and females separately, with SES and each of the RST variables entered as potential predictors. The results are shown in Table 3. For females, the model accounted for 28% variance in ASB, with Goal-Drive Persistence (negative) and Impulsivity (positive) independent predictors. For males, the model accounted for 27% variance in ASB. Impulsivity was again predictive, as was GDP, but in this case, GDP shared positive variance with ASB. For males, Reward Interest was also a negative predictor.

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### **Study 1 Summary**

In sum, Study 1 showed that a key difference between males and females concerns the RST factor Goal-Drive Persistence. Female participants showed a negative association



between this variable and levels of ASB, while for males the association was positive. The latter result supports that of Morgan et al. (2014) who also observed heightened BAS in male participants (they did not include females in their sample).

## Study 2

It could be the case that males who are high in GDP use ASB (and possibly crime more generally) as a means to pursue their long-term social and personal goals and improve their circumstances. Study 2 tested this possibility in the context of Strain Theory (Agnew, 2007, 2012). Strain theory suggests that individuals commit offences because they experience adverse life circumstances that lead to emotional and practical strains. Their goal is to escape, or cope better with, these circumstances and pursue this goal through antisocial, rather than prosocial means. Sometimes the ASB is clearly practical, such as being short of money and stealing something to eat. In other cases, behaviours may alleviate negative emotions, possibly by using drugs or bullying someone weaker. Criminal coping also occurs when people perceive that they lack the ability to deal with their situation in any other way, for instance, not having the verbal or emotional intelligence skills to deal with difficult relationships, or where violence is perceived to be an appropriate response to interpersonal conflict (Piquero et al., 2004). The adolescent peak in ASB is explained in that young people generally have little say in terms of where they live, who with, the school they attend etc. If these settings are distressing or abusive there is little they can do and may turn to antisocial behaviours such as truancy, fighting back, running away etc. in order to escape or gain a sense of control (Agnew, 1985, 2007, 2011).

Many studies which have attempted to explain adolescent ASB have suggested that social factors play a large part in its aetiology, particularly the role of parenting and disruptive family environments (Johnson et al., 2004) and factors associated with low socio-economic status such as poverty, low educational attainment, inequality and social exclusion (e.g., Kramer, 2000). Kramer (2000) argued that structural forces reduce the ability of families and communities to provide the social support and informal social control needed to prevent ASB in young people. However, it is argued that ASB is not caused by low SES per se, but rather the economic problems associated with it (Agnew et al., 2008). It is also important to note evidence that ASB is a manifestation of an interaction between innate traits and social circumstances (Tuvblad, Grann, & Lichtenstein, 2005), for instance, the effects of impulsivity are stronger in poorer neighbourhoods (Lynam et al., 2000). In Study 2, we examine the relationship between ASB, RST traits and three types of strain known to precipitate ASB and crime (Agnew, 2007). If males who experience a lot of life strain when younger are those most likely to pursue goals through antisocial means, then we would expect to observe the same positive association between GDP and ASB as in Study 1, but this effect will be moderated such that the association will be strengthened in males who have experienced the most strain.

## **Method**

### **Participants**

Study 2 extended the research to a non-student sample. Two hundred and eighty two participants were recruited from Prolific Academic, an online research platform, 166 females ( $M_{age} = 35.19$ ,  $SD = 11.87$ ) and 116 males ( $M_{age} = 35.26$ ,  $SD = 12.74$ ,  $p = .96$ ). Recent

research has shown that participants recruited from the site are psychologically naïve and diverse in terms of representations of the general population (Peer, Brandimarte, Samat, & Acquisti, 2017).

## **Materials and Procedures**

Participants were supplied with a web link to the questionnaire battery, which was again hosted online by Survey Monkey. All completed the same SES, ASB and RST measures as in Study 1: ASB  $\alpha = .91$ ; RST, FFFS = .79; BIS = .94; BAS Reward Interest = .81; BAS Goal-Drive Persistence = .86; BAS Reward Reactivity = .85; BAS Impulsivity = .80. In addition, participants also completed a measure which assessed levels of strain during childhood/adolescence in three areas which have been shown to present risk for ASB (Agnew, 2007). This comprised 7 items relating to Family strains (e.g., Death of a parent or other close family member; Violence, abuse of drugs and/or alcohol within family), 9 items relating to Relational strains (e.g., bullying, experience of physical or emotional abuse) and 14 items relating to Financial strains (e.g. Sold possessions to get cash, property repossessed). Participants were asked to indicate any of the strains which they had experienced prior to age 18 (or which they recalled their family having experienced) and “Yes” responses were summed to give an overall score whereby a higher score indicated a higher level of strain.

## **Results**

No significant sex-differences in reports of background SES were observed (Males  $M = 4.76$ ,  $SD = 1.60$ ; Females  $M = 4.91$ ,  $SD = 1.42$ ;  $p = .41$ ,  $d = .09$ ). The lower section of Table 1 presents the descriptive statistics for the other measures. Again, males reported significantly more ASB than females while females presented higher scores on both

Response Reactivity Alison: we need to define these, if we are to using them – although it would be better for the reader if we spelled them out always and FFFS. Males reported higher levels of interpersonal strain than females. The lower section of Table 2 presents correlations for this study. Again, BAS Impulsivity was positively correlated with ASB for both groups and, in line with Study 1, significant sex differences in the relationship between ASB and both GDP and RR were observed with males showing positive associations while in females the relationship was negative (GDP) or negligible (RR). In addition, Study 2 presented sex-difference in the relationship between ASB and RI with males showing a positive association and females a negative one. Female ASB was also positively associated with BIS in this study. A similar relationship was observed in Study 1 but in that case, the association did not reach statistical significance. All three of the strains showed significant positive associations with ASB for females (family  $r = .29$  financial  $r = .41$ , relational  $r = .59$ ,  $p < .001$  in each case). For males, this was also the case for family ( $r = .37$ ) and financial strains ( $r = .35$ ,  $p < .001$  in both cases), however relational strain showed a negligible relationship with ASB for males ( $r = -.02$ ).

We computed a linear regression incorporating the RST and strain factors as potential predictors of ASB. We conducted this analysis for male and female participants separately and then compared the size of the influences between models using  $z$  tests for regressions (see Kleinbaum & Kupper, 1978; Wuensch, 2016). The results are shown in Table 4

PLEASE INSERT TABLE 4 ABOUT HERE

In both models, the strain criteria were the strongest predictors of ASB, however, for female participants it was Relational while for males it was Financial. Notably significant differences between the models were found, again, in the negative GDP predictor variable for female participants and the positive GDP predictor for male participants. Further, the predictive value of Relational strain criteria was significantly different between male and female participants, being a weak negative correlation for male participants and a strong positive correlation for Female participants. Overall, the female model accounted for 46% variance in ASB, while for males the model shared 31% variance with ASB. We also tested potential interaction variables to investigate the predicted moderation effects of strain on the GDP-ASB and RR-ASB relationships. However, none showed independent predictive power or improved the fit of the models significantly ( $p > .5$  in all cases). Figure 1 illustrates the overall relationship between strains, RST factors and ASB.

PLEASE INSERT FIGURE 1 ABOUT HERE

## **Study 2 Summary**

The second study in this paper replicated and expanded the effects found in Study 1. Again, all participants showed a relationship between ASB and Impulsivity and results further suggest that higher Goal-Drive Persistence increases male ASB and deters female ASB. However, Study 2 revealed that life strains had a greater impact on propensity to ASB than RST traits. Particularly it was found that financial strains strongly related to male ASB and Relational strains for female participants.

## **Discussion**

Overall, these studies have shown that personality traits measured within the revised RST framework can influence the levels of ASB adolescents engage in and that there are sex-differences in these effects. Study 1 showed that antisocial males are impulsive, as previous research has shown, and also present with higher Goal-Drive-Persistence and Reward Reactivity. Antisocial females are also impulsive, but show no evidence of goal or reward-oriented behaviour. Study 2 examined whether goal-orientation behaviour in antisocial males could be related to strain (i.e., might ASB be a way to escape or fight back against deprivation, inequality or perceived injustice). We replicated the effects of GDP in a non-student population, though in this case the regression analysis suggested that Response Reactivity was additionally influential for females as well as males. As expected, we showed that strains relating to family, financial and relational situations impact on level of ASB overall but, additionally, evidence of sex-differences in the type of strain which is most predictive. Financial strains were a significant factor for both groups, while relational factors were additionally important for females only. In sum, individuals who experience strains in childhood and adolescence are more likely to engage in ASB, and so are individuals who are impulsive, reward responsive and, in the case of males, goal-driven. However, these strain and personality factors do not appear to interact. This does not mean that antisocial individuals with the traits in question have not experienced strains, but that this is not necessarily the case, and vice versa.

The distinction between male and female participants in terms of their relationship between GDP and ASB can be associated with characterisations of antisocial behaviour as either instrumental (i.e., proactive, purposeful and goal directed) or reactive (defensive, expressive and often hostile). These classifications have been widely applied to specifically

aggressive behaviours (Berkwitz, 2003; Kempes, Matthys, de Vries, & van Engeland, 2005) and to adult criminality (Piquero & Tibbetts, 2002), and more recently have been extended to antisocial activities in adolescence such as theft, cheating and illicit drug use (Fontaine, 2006; Fontaine & Dodge, 2006). In the present studies, that male ASB has consistently shown a positive association with GDP does suggest that their behaviour may be instrumental in nature, whereas female ASB is more reactive, relating only to high impulsivity and to BIS. Reactive ASB has been characterised as emotional, highly aroused, and responsive to a perceived provocation or threat (Fontaine, 2006) and BIS is responsive to aversive stimuli and motivates avoidance behaviours. As such, both forms of behaviour can be related to strain risk factors with males and females coping in different ways. Much research has suggested sex-differences in adolescent antisocial behaviour and its associated psychopathology in response to stressful circumstances. Young females predominate in internalised disorders such as depression and anxiety, while males predominate in externalised, often antisocial, behaviours (Hartung, Milich, Lynam, & Martin, 2002; Huselid & Cooper, 1992; Leadbeater, Blatt, & Quinlan, 1995). Males and females also generally differ in level and nature of ASB, with males tending to engage in more criminal and violent activities than females, although the sex gap narrows with minor offences. Indirect aggression (such as bullying) is prevalent amongst adolescent females (Archer, 2004; Österman et al., 1998) and much of their ASB is linked to adversarial social relationships (Odgers & Moretti, 2002). Kennedy et al. (2015) report that young female offenders present with higher incidences of childhood abuse and family conflict than non-offenders. That relational strains were predictive of ASB for females, but not males, in our Study 2 reflects this and it may be that ASB is a reaction to these factors. For males, financial risk factors

were an important predictor of ASB and if their goals are to overcome these circumstances, theft or other actions to obtain final relief may clearly be instrumental in nature.

As such, it is perhaps surprising that we did not observe the moderating effect of strain on the relationship between personality and ASB that we predicted. One explanation may lie in the nature of our sample. Although UK student populations are increasingly heterogeneous in nature, and populations recruited through online platforms are claimed to be socially inclusive (Peer et al. 2017), it remains that individuals from the lower SES levels were underrepresented in our samples. Participants did report ASB and the experience of strains, however it may be that they had protective factors (such as social support, good schooling) which, to an extent, buffered them from the negative effects. Therefore, although those with more risk factors or the relevant personality traits do commit more antisocial acts, the two variables do not necessarily interact significantly. Social representativeness in participant samples has been a limitation of much research on the aetiology of ASB (Agnew et al., 2008) and emphasises how some more hard to reach sectors of society are unlikely to spontaneously engage in research.

We collected self-reports of ASB and delinquency and although such research methods are frequently employed, the limitations inherent in self-report must be acknowledged. Also, we obtained retrospective reports of adolescent behaviour and some of these may have been subject to distortions related to memory or impression management. Personality traits (including those associated with RST) are thought to be relatively stable constructs, however, the need for longitudinal research to support the present findings, and to



further understand how personality traits might influence ASB and offending further into the life course.

In conclusion, the studies presented in this paper particularly highlight how life strains and personality traits can lead to ASB. Importantly, this paper highlights the differences in key risk traits and strains for males and females. Male ASB appears to be more ‘means to an end’ driven, being strongly affected by financial strains and personality traits associated with assiduousness and persistence. The relational strains and impulsivity traits associated with female ASB reflects a more impulsive and interpersonal-reactive pattern of behaviour. Future public programmes and research should seek to focus theory and interventions based on these different motivations. Interventions and theories of ASB should include the different needs of male and female offenders.

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	Males		Females		Sig. differences
	Mean	SD	Mean	SD	
<i>Study 1</i>					
ASB	15.41	9.10	12.39	8.14	$t(285) = 2.94, p = .003, d = .35$
BAS Reward interest	16.52	4.10	17.27	4.11	$p = .13, d = .18$
BAS Goal drive persistence	18.78	4.59	21.06	4.45	$t(285) = 4.21, p < .001, d = .51$
BAS Reward reactivity	25.44	5.26	28.43	5.25	$t(285) = 4.72, p < .001, d = .57$
BAS Impulsiveness	19.68	4.70	18.50	4.71	$t(285) = 2.11, p = .04, d = .25$
BIS	60.43	13.81	61.20	14.36	$p = .65, d = .05$
FFFS	21.42	5.70	24.12	5.82	$t(285) = 3.90, p < .001, d = .47$
<i>Study 2</i>					
ASB	15.14	9.35	11.01	7.60	$t(280) = 4.07, p < .001, d = .49$
BAS Reward interest	17.21	4.18	15.98	3.95	$t(280) = 2.50, p = .01, d = .30$
BAS Goal drive persistence	18.62	4.61	18.46	4.40	$p = .76, d = .04$
BAS Reward reactivity	25.01	5.78	26.97	5.12	$t(280) = 2.98, p = .003, d = .36$
BAS Impulsiveness	17.53	4.74	17.20	4.93	$p = .58, d = .07$
BIS	56.90	15.05	59.28	14.83	$p = .19, d = .16$
FFFS	21.11	6.03	24.42	5.67	$t(280) = 4.70, p < .001, d = .57$
Family strain	1.51	1.52	1.65	2.28	$p = .56, d = .07$

Financial strain	2.60	2.54	2.26	2.19	$p = .15, d = .15$
Interpersonal strain	2.39	2.02	1.87	1.95	$t(280) = 2.17, p = .03, d = .26$

Table 1. Descriptive statistics for males and females in both studies.

Table 2. Studies 1 and 2, Pearson's  $r$  correlations, controlling for SES, between Antisocial Behaviour and RST traits for whole sample, female participants alone and male participants alone, with Fisher's  $Z$  test for sex-difference between correlations.

	Whole Sample	Female	Male	Fisher's $Z'$
<i>Study 1</i>				
BAS-RI	.04	.06	.05	.08
BAS-GDP	-.03	-.25*	.34**	5.02**
BAS-RR	.16	.08	.39**	2.73*
BAS-Imp	.40**	.47**	.38**	.91
FFFS	-.08	-.11	.05	1.32
BIS	.16	.12	.23	.94
<i>Study 2</i>				
BAS-RI	.05	-.17*	.23*	3.32**
BAS-GDP	.07	-.28**	.46**	6.41**
BAS-RR	.17**	.04	.41**	3.23**
BAS-Imp	.26**	.28**	.23*	.44
FFFS	.10	.02	-.03	.41
BIS	-.06	.21*	.03	1.50

BAS= Behavioural Approach System, RI= Reward Interest, GDP= Goal-Drive Persistence, RR= Reward Reactivity, Imp= Impulsivity, FFFS= Fight/Flight/Freeze System, BIS= Behavioural Inhibition System  
\*p<.01, \*\*p<.001

Table3. Study 1, results of linear regression analysis on ASB for male and female participants and Fisher's Z comparison of effects across groups.

	<u>Female</u>					<u>Male</u>					Z difference
	$\beta$	t	p	95% CI lower    Upper		$\beta$	t	p	95% CI lower    Upper		
SES	.06	.91	.36	-.40	1.09	-.06	-.73	.47	-1.25	.58	
RI	.01	.13	.90	-.34	.39	-.23	-2.51	.01	-.93	-.11	
GDP	-.24	-2.84	.01	-.76	-.14	.27	2.83	.01	.16	.93	
Imp	.02	.28	.78	-.23	.30	.19	1.93	.06	-.01	.67	
RR	.46	5.77	< .001	.52	1.07	.33	3.49	.001	.28	.20	
FFFS	-.14	-1.83	.07	-.39	.02	-.15	-1.71	.09	-.50	.04	
BIS	.05	.71	.48	-.05	.11	.13	1.46	.15	-.03	.20	

Table 4. Study 2, results of linear regression analysis on ASB for male and female participants and Fisher's Z comparison of effects across groups.

	<u>Female</u>					<u>Male</u>					Z difference
	$\beta$	t	p	95% CI lower Upper		$\beta$	t	p	95% CI lower Upper		
FFFS	-.13	-2.02	.05	-.34	-.004	-.17	-1.92	.06	-.54	.01	.39
BIS	-.04	-.54	.59	-.09	.05	.04	.40	.69	-.09	.13	.65
RI	-.14	-1.60	.11	-.59	.06	-.07	-.71	.47	-.62	.29	.48
GDP	-.25	-3.19	.002	-.71	-.17	.27	2.49	.01	.11	.97	3.90*
Imp	.18	2.29	.02	.04	.49	.30	2.64	.01	.12	.84	.87
RR	.21	3.03	.003	.11	.53	-.02	-.20	.84	-.45	.37	1.82
Family	.09	1.37	.17	-.12	.69	.10	1.11	.27	-.50	1.77	.17
Financial	.16	2.33	.02	.08	.99	.31*	3.28	.001	.44	1.80	1.27
Relational	.44*	6.26	< .001	1.12	2.15	-.12	-1.38	.17	-1.40	.25	4.98*

\*  $p \leq .001$

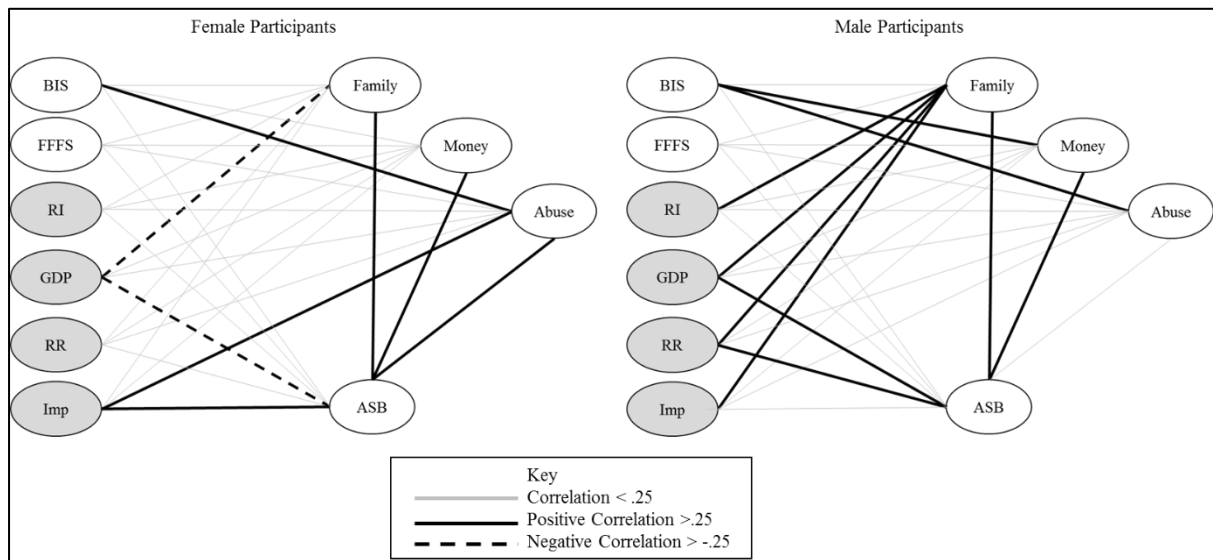


Figure 1: Path diagrams illustrating relationship between ASB, RST factors and strains for male and female participants.