

**Role of general anxiety on the association between callous-  
unemotional traits and affiliative reward**

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**Abstract**

Callous-unemotional (CU) traits, defined by its associated lack of empathy and guilt and a shallow affect are closely related to an inverted pattern of social reward valuation. This present study investigated general anxiety potential as a moderator of the relationship between CU traits and social reward subscales associated with this inverted valuation of social reward. Specifically, this study investigated this potential moderating effect on the association between CU traits and the subscales Negative Social Potency and Prosocial Interactions, both of which are core components of affiliative reward. Prosocial interactions represent positive affiliative reward, while negative social potency can be seen as negative affiliative reward. This study utilized two linear regression moderation analyses to investigate this potential moderating relationship. The inclusion of anxiety within these models was to not only investigate its potential as a moderating variable but also as a “proxy” to distinguish between the primary and secondary variants of CU traits. This study utilized the inventory for Callous-unemotional traits (ICU), the social reward questionnaire- adolescent version (SRQ-A) and the Depression, Anxiety and stress scale (DASS-21), in order to measure the key variables. Results found that CU traits were positively associated with negative social potency irrelevant of the level of anxiety. In contrast Prosocial Interactions and CU traits were negatively associated and were not moderated by the level of anxiety. Although a near significant interaction of anxiety in this model indicates that anxiety has a potential moderating effect although this was not found in this present study. Overall, the results fall in line with the etiological account of the developmental pathways of CU traits and show that anxiety does have a role to play, particularly for those with the acquired CU variant.

*Keywords;* Callous-unemotional traits, Anxiety, Negative Social Potency, Prosocial Interactions,

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### **Role of general anxiety on the association between callous-unemotional traits and affiliative reward**

What is it about chatting that is so enticing? What is so de-stressing about talking to a friend about your worries? Why do we feel so powerful telling off a bully? Why do some people find it so enjoyable to be mean, yet others struggle to even talk in the first place? Positive social interactions prove to be generally rewarding experiences, whether an individual looks to vent about work, receive praise for their newly purchased clothes or simply finding relief from talking to a friend. Research has defined these “socializing-payoffs” as social rewards, which are the perceived pleasurable and enjoyable aspects of interactions between people (Foulkes et al., 2014).

For most individuals social interactions are positive, rewarding experiences that promote closeness and social learning (Smeijers et al., 2022). However, there is a subset of individuals who possess certain traits that may develop as a consequence of a predisposition for alterations in the experience of social reward. These traits are characterized by a lack of empathy or guilt and a shallow affect and are referred to as callous-unemotional (CU) traits (Frick et al., 2004). CU traits concern the affective facet of psychopathy, which more broadly, focuses on the emotional and interpersonal characteristics of psychopathy (Frick et al., 2004). These traits are associated with early-onset and continuous antisocial behaviours amongst children and adolescents and are seen as a strong predictor of antisocial behaviour (Larstone et al., 2018). Individuals with high CU traits have often shown more severe, chronic, and aggressive patterns of behaviour than individuals who show conduct problems in the absence of CU traits (Frick, 2015). CU traits are closely associated with personality dimensions such as sensation seeking and are also negatively correlated with other personality dimensions such as agreeableness and conscientiousness (Romero et al., 2017). For individuals who empathy

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does not come naturally to it is apparent that they will encounter difficulties socializing throughout their lives.

Unlike the majority of the population, some individuals who are high in callous-unemotional traits may possess an altered predisposition to the experience of social interactions. The lack of empathy and guilt associated with these traits can cause individuals high in CU traits to struggle with understanding and resonating with others' emotions. This coupled with a higher likelihood of engaging in the manipulation of others for personal gain can lead to difficulties in forming and maintaining healthy relationships with others (Frick et al., 2013). Furthermore, the severe and stable pattern of aggressive and antisocial behaviour associated with these traits may further isolate them from their peers leading to social rejection and isolation. (Zhu et al., 2023). As previously mentioned, in general, individuals seek interactions in a prosocial manner, experiencing reward from self-disclosure and bonding with peers. These rewards are known as social rewards and refer to the positive reinforcement one receives from social interactions and relationships. However, given the associated predisposition to act antisocially, individuals high in CU traits typically show an atypical pattern of social reward, where they find enjoyment from the suffering of others and are less likely to engage in positive reciprocal interactions. In order to understand this inverted social reward mechanism, it is necessary to discern the social rewards that are relevant to studying the socializing abilities associated with these traits. Studies that explored the social rewards most relevant to CU traits have discerned two types of rewards that best describe the inverted social reward mechanism. Firstly Prosocial interactions, which is similar to prosocial behaviours in that it describes behaviours that are aimed for benefiting others (Foulkes et al., 2017). In relation to the reduced emotional capacity associated with CU traits it is apparent that individuals high in CU traits would not typically find prosocial interactions as rewarding experiences. Conversely, negative social potency describes behaviours attempting to influence others through negative and manipulative means. Given the severe, chronic, and aggressive

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pattern of behaviour generally exhibited by individuals it is expected that individuals high in CU traits will generally find negative social potency as rewarding.

An important focus of research when studying CU traits is understanding the distinction between the two developmental paths that lead to CU traits and how these subvariants differ in their presentation. Primary CU traits are characterized by notably low levels of generalized anxiety and may result from an innate or hereditary deficiency in the individual's capacity for emotional experience (Craig et al., 2021). This innate deficiency is best seen through the lens of affiliative reward. Affiliative reward specifically refers to the pleasure derived from forming and maintaining social bonds and closeness with others, and it is what helps enhance and reinforce interpersonal relationships and group cohesion (Waller & Wagner, 2019). Individuals with primary CU traits typically exhibit low affiliative reward, which can be seen as a developmental precursor to their reduced capacity for emotional experiences. For those high in affiliative reward positive social interactions are rewarding and help reinforce prosocial behaviours. Given the inverted social reward mechanism typical in individuals high in CU traits they are less likely to find social interactions rewarding. This affiliative reward deficiency can hinder the development of emotional bonds and empathy leading to the social and emotional characteristics of primary CU traits. In contrast, secondary CU traits have been proposed to reflect a psychological adaptation to significant environmental stressors, such as experiences of parental rejection or abuse and generally co-occur with heightened anxiety (Craig et al., 2021). Despite the inherent deficit in emotional capacity that is typical in primary CU traits, individuals with acquired CU traits may not display the same low levels of affiliative reward. As acquired CU traits develop as an adaptive response to early-life environmental stressors, these individuals may still have the capacity to experience affiliative reward. However, the expression of the prosocial behaviours that affiliative reward reinforces may be suppressed due to the acquired CU traits.

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This differentiation highlights the importance of understanding how the inverted social reward mechanisms, particularly in relation to prosocial interactions and negative social potency, differ between the two variants. As previously stated, prosocial interactions describes behaviours that are aimed for benefiting others, which, given their innate deficiency of their emotional capacity might be experienced as less rewarding by individuals with primary CU traits (Foulkes et al., 2017). Instead, they more often present a strong positive valuation of negative social potency (Foulkes et al., 2017). This inverted rewards mechanism is also seen in individuals with secondary CU traits, which is characterized by heightened anxiety and may also display a strong positive valuation of negative social potency (Foulkes et al., 2014). While this inverted rewards mechanism is innate in the Primary variant of CU traits, in terms of the acquired variant this can be seen as attempts to project control and dominance as a defence response to stressful situations (Craig et al., 2021). Exploring the interplay between generalized anxiety, affiliative reward and CU traits is imperative to understanding the complex social behaviours of individuals with CU traits.

In supporting and developing future interventions to remodel correct prosocial behaviours amongst individuals with Callous-unemotional traits, it is imperative to understand how general anxiety is involved in the relationship between callous-unemotional traits and affiliative reward. This subsequent study aims to explore this relationship. The findings from this study could possibly lend credence to treatments focusing on the management of general anxiety amongst individuals high in callous-unemotional traits and shed more light on the unseen mechanisms that effect their socializing abilities.

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### Method

#### Participants

The study participants were international and Dutch first-year psychology students at the University of Groningen. The sample consisted of 72.5% females, 27.5% males, the age ranged from 18 to 27 with a mean age of 20. They were recruited to participate as part of the mandatory course in which credits need to be acquired by participating in studies conducted by third-year Bachelor and Master psychology students. Therefore, the sample is a convenience sample. In order to be eligible to participate in the current study, participants were required to possess sufficient English proficiency. The participants were informed how their data would be processed and had to provide consent to proceed with the study. In total, 93 participants completed the survey. However, due to time constraints, the sample used for the data analysis consisted of 52 participants.

#### Procedure

Participants were notified of the study through their SONA accounts, where they could read the study information and decide whether to sign up. The participants accessed the survey through their SONA accounts. At the beginning of the survey, participants were informed, during the informed consent page, precluding the questionnaires themselves, about what the study was investigating. This page did not inform participants that the topic of the study concerned Callous-unemotional traits. On this informed consent page, participants were informed about their right to withdraw their data from the study and could also choose to sign off on a consent form, allowing their data to be used in the study.

After this, the sex of the participant was asked, as well as their age, before they began the questionnaires. The questionnaires were introduced in the following order: The Inventory for Callous-Unemotional Traits (ICU) youth version (ICU), the Social Reward Questionnaire Adolescent version (SRQ-A), Experiences in Close Relationships—Revised (ECR) questionnaire, and The Depression, Anxiety, Stress Scale - 21 Items (DASS-21). At the end of

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the survey, participants were thanked for taking part and debriefed. In this debriefing page, the aim of the study, callous-unemotional traits, was revealed and explained to the participants. Here, participants were again reminded of their right to withdraw their consent to the use of their data. This study was approved by the Faculty of Behavioural Sciences ethics committee at the University of Groningen. Note that this study comes from a larger, ongoing study that uses the same survey. this paper is only interested in callous-unemotional traits, social reward and anxiety, therefore these are the only variables of concern in this statistical analysis,

### **Questionnaires/Measures**

#### ***Callous-Unemotional Traits***

CU traits were assessed by the Inventory of Callous-Unemotional Traits (ICU) youth version (Frick, 2017). In total, the ICU consists of 24 items. Eleven items measure callousness (e.g., “I do not care who I hurt to get what I want.”), eight measure uncaring traits (e.g., “I always try my best.”). Moreover, five items measure unemotional traits (e.g., “I am very expressive and emotional.”). The ICU is rated on a 4-point Likert scale ranging from 0 (not at all true) to 3 (definitely true). After reverse coding items, the responses were summed to a total score. The Cronbach’s alpha for the total scale when the ICU was first administered was .81 (Frick, 2017). Additionally, a meta-analysis found Cronbach's alpha of .81, showing good internal consistency, and an average correlation coefficient across multiple studies of .34, showing moderate external validity (Cardinale et al., 2017). In this study, Cronbach's alpha was .716. Although this survey was initially developed for youth populations, there is support for its applicability to adults (e.g., Kimonis et al., 2013).

#### ***Social Reward***

The Social Reward Questionnaire Adolescent version (SRQ-A; Foulkes et al., 2014) categorises five types of social reward: admiration, passivity, sociability, negative social



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potency, and prosocial interaction. Admiration refers to the reward from receiving flattery and attention and has four items (e.g., “I enjoy getting praise from others”). Passivity addresses the reward of surrendering one’s authority to someone else and has three items (e.g., “I enjoy letting someone else tell me what to do”). Sociability refers to the pleasure of participating in group activities and has three items (e.g., “I enjoy going to parties”). Negative social potency refers to the reward from being cruel, callous, and using others for one’s benefit. It has five items (e.g., “I enjoy seeing others get hurt”). Lastly, prosocial interaction addresses the enjoyment of reciprocal relationships and has five items (e.g., “I enjoy treating others fairly”). The questionnaire consists of 20 items, rated on a 7-point Likert Scale ranging from “Strongly Disagree” to “Strongly Agree.” During the analysis, the composite score was calculated for the relevant subdimension. The Cronbach’s alpha for this questionnaire was found to be .82 in a validation study (Foulkes et al., 2014). In this study, Cronbach's alpha is .771.

### ***Anxiety***

The survey included the anxiety items from The Depression, Anxiety, Stress Scale - 21 Items (DASS-21) questionnaire (Lovibond and Lovibond, 1995). There were, in total, seven items. The anxiety scale items assessed skeletal muscle effects, “e.g., “I experienced trembling (e.g., in the hands),” physiological arousal (e.g., “I was aware of dryness in my mouth”), situational anxiety (e.g., “I was worried about situations in which I might panic and make a fool of myself”), and subjective experiences of anxious emotions (e.g., “I felt I was close to panic”). The participants were asked to rate these items on a 4-point Likert scale ranging from 0 (*never*) to 3 (*almost always*). The items were added up during the analysis to get a total anxiety score. Additionally, Lovibond and Lovibond (1995) found, for the anxiety scale, a Cronbach’s alpha of 0.84, showing good internal consistency. The Cronbach’s alpha estimate computed for the current study was .893.

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### **Statistical analysis**

All of the analyses were conducted using SPSS and the SPSS PROCESS macro extension (Hayes, A. F. 2012). firstly the initial steps of the analysis began with clarifying that our variables met the assumptions of linearity, independence, multicollinearity. Further assumption checks were conducted to clarify that the residuals met the assumptions of normality and homoscedasticity. The assumptions of normality and linearity were assessed via a Q-Q plot of residuals of Negative Social Potency and Prosocial Interactions. Furthermore, the Q-Q plot was also used to assess the assumption of homoscedasticity. (Appendix A) Lastly, multicollinearity and independence of observations were assessed through a VIF score and the Durbin-Watson statistics respectively.

The first step of the analyses involved creating descriptive and frequency statistics in order to organize the data and identify the variability and means of these key variables. In order to explore the associations between callous-unemotional traits, negative social potency, and prosocial interactions, two separate stepwise linear regression models were constructed. The first model placed negative social potency as the dependent variable with callous-unemotional traits as its predictor in the first step. A similar approach was also used in the second linear regression model, with prosocial interactions as the dependent variable and Callous-unemotional traits again, as the predictor. Furthermore, in order to examine the potential moderation effects of general anxiety within both models, an interaction term of (callous-unemotional traits x anxiety) was created via the Process macro-SPSS extension and added to both models in the second step. The interaction term was quantified through the use of a Confidence Interval significance test to assess the potential moderating effect of general anxiety on the association between CU traits and the SRQ subscales. It should be noted that due to the small sample size (N = 51) bootstrapping was performed throughout all stages of the analysis for increased robustness of the result The alpha level used in this analysis was 0.05.

## Results

### Sample characteristics and Descriptive analysis

From the initial sample of 52 participants, 1 chose to withdraw their consent from the study. The final sample consisted of 37 females and 14 males ( $M_{age} = 20$  and  $SD_{age} = 2,163$ ). Table 1 presents the descriptive statistics of the key variables of this study. The dependent variable, Negative social potency, had a low overall score given the scale. while the other dependent variable, Pro-Social Interactions had a generally high score based on the scale. The mean scores of the predictor variable, CU traits, were found to be moderate. This was found to be the same for the moderator variable, Anxiety, which also had a moderate mean score based on its scale.

**Table 1a**

- *Descriptive statistics*

variable	N	Minimum	Maximum	Mean	S.D.
CU-traits	51	33,00	65,00	47,6275	6,8962
Anxiety	51	6,00	25,00	15,0392	5,1651
Negative social potency	51	5,00	28,00	11,8627	5,5462
Prosocial-Interactions	51	13,00	34,00	29,3922	4,0697
Valid N (listwise)	51				

The correlation matrix presented in Table 2 presents the relationships between the key variables of this study. A strong and significant positive association was found between negative social potency and CU traits. In addition to this a strong and significant negative correlation was found between CU traits and Prosocial Interactions. Anxiety displayed a moderate and significant positive correlation with negative social potency however its correlation with prosocial interactions was weak and non-significant.

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**Table 1b***Correlation coefficients*

	1.CU Traits	2. Anxiety	3.NSP	4. PSI
1.CU Traits	—	,003	,640**	-,575**
2.Anxiety	,003	—	,229	-,115
3.NSP	,640**	,229	—	-,396
4.PSI	-,575**	-,115	-,396	—

Note: values are person correlations N=51, \*\*correlation is significant at  $p \leq 0.01$  (2-tailed)

Assumption checks can be found in appendix A.

Normality was assessed visually by inspecting the Q-Q plots of the standardized residuals. In Model 1 (NSP), the Q-Q plot showed minor deviations at the tails but overall, the residuals were normally distributed along the line of normality (Appendix A, Figure 1). In model 2 (PROSOC), the observations were the same with slight deviations occurring at the tails but, in total, a normal distribution of the residuals (Appendix A, Figure 2) . These slight deviations are not that significant to have any serious impact on the models; that is why we can assume normality.

Linearity and homoscedasticity were also tested by the visual inspection of a graph (Appendix A, Figure 3 & 4). A scatterplot was made of the standardized residuals against the standardized predicted values in each model. In both the models, the residuals were randomly distributed across the X axis, and it can be said that linearity had been satisfied in both the models. In addition, the residuals, on average, had a constant spread across all levels of the predicted values. Although slight suggestions of heteroscedasticity were there, these were not significant enough to invalidate the findings of the models. So, the assumption of homoscedasticity was almost satisfied. The assumption of independence of residuals was an important assumption to be satisfied for applying the bootstrapping method to the model.

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The Durbin Watson statistic was tested to check for their independence. In model 1 (NSP) the coefficient was 1.980 and in model 2 (PROSOC) 1.901. In both the Durbin-Watson statistics the values were close to the value of 2; that is why there was no serious autocorrelation. Finally, multicollinearity assumption was confirmed via the use of Variance Inflation Factor (VIF) in both of the reduced regression models to ascertain the degree to which the main effects were not biased due to the inclusion of the interaction variables. The VIF values of both of the models were all less than the VIF = 10 cut-off point, and this was a confirmation that multicollinearity was not a concern in the analyses.

### Hypothesis testing

In the first step of the first analysis, the predictors CU Traits and Anxiety were entered into the model which was bootstrapped to 5000 samples. The results indicated that CU traits were a significant predictor of negative social potency and simultaneously, anxiety was found to be a significant predictor of negative social potency. Refer to table 2a for statistics.

**Table 2a**

*Regression coefficients*

*Negative Social Potency model*

step	B	Bootstrap <sup>a</sup>			95% Confidence Interval		
		Bias	Std. Error	Sig. (2-tailed)	Lower	Upper	
1	(Constant)	-16,280	-,126	4,215	,001	-24,935	-8,256
	CU Traits	,514	,003	,083	,000	,350	,682
	Anxiety	,244	,000	,108	,024	,035	,458

*Note:* Unless otherwise noted, bootstrap results are based on 5000 bootstrap samples

Next, the interaction between callous-unemotional traits and anxiety was added to the model using the PROCESS macro-SPSS. The interaction term was found to be non-significant. The inclusion of the interaction variable changed the significance of the predictors, with CU traits becoming more significant, as well as Anxiety. The interaction term was found to be non-significant indicating that the effect of callous-unemotional traits on

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negative social potency is not moderated by anxiety. The overall model explained 48.2% of the variance of Negative Social Potency ( $R^2 = 0.482$ ,  $F(3,47) = 14.5955$ ,  $p < 0.0001$ )

**Table 2b**

*PROCESS Macro Coefficients*  
*Negative Social Potency model*

Step	Coeff	Bootstrap <sup>a</sup>			95% Confidence Interval		
		SE	t	P	Lower	Upper	
2	(Constant)	11.8596	-,05764	20,5768	,0000	-10,7001	13,0191
	CU traits	,5159	,0844	6,1116	,0000	,3461	,6858
	Anxiety	,2637	,1136	2,3216	,0246	,0352	,4922
	InteractionC UxAnxiety	,0279	,0200	1,3967	,1691	-,0123	,0681

a. Unless otherwise noted, bootstrap results are based on 5000 bootstrap samples

Following the analysis of the first model, the second hierarchical regression analysis was created to test the second hypothesis, which investigated the moderating effect of generalized anxiety on the association between callous-unemotional traits and prosocial interactions. CU traits was a significant negative predictor of prosocial interactions.

Furthermore, anxiety was found to be a non-significant predictor of prosocial interactions.

refer here to table 2b

**Table 3a**

*Regression coefficients*  
*Prosocial Interactions model*

Step	B	Bootstrap <sup>a</sup>			95% Confidence Interval		
		Bias	Std. Error	Sig. (2-tailed)	Lower	Upper	
1	(Constant)	46,876	,020	4,457	,000	38,499	55,946
	CU traits	-,339	-,002	,096	,002	-,546	-,169
	Anxiety	-,089	,004	,075	,242	-,230	,063

a. Unless otherwise noted, bootstrap results are based on 5000 bootstrap samples

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In this second step, ICUTOTAL remained a significant negative predictor of prosocial interactions. Similarly, ANXIETY remained a non-significant predictor of prosocial interactions. The Interaction term was non-significant indicating that anxiety did not moderate the association between CU traits and prosocial interactions. However, the interaction term did approach near-significance indicating a potential moderating effect. In sum, the second model explained 39.1% of the variance of prosocial interactions ( $R^2 = 0.391$ ,  $F(3,47) = 14.5955$ ,  $p < 0.0001$ )

**Table 3b***PROCESS Macro Coefficients**Prosocial Interactions model*

Step		Bootstrap <sup>a</sup>				95% Confidence Interval	
		B	SE	t	p	Lower	Upper
2	(Constant)	29,3956	,4586	64,0966	,0000	28,4730	30,3182
	CU traits	-,3412	,0672	-5,0795	,0000	-,4763	-,2061
	Anxiety	-,1109	,0904	-1,2265	,2261	-,2927	,0710
	InteractionC UxAnxiety	,0306	,0159	-1,9276	,0600	-,0626	,0013

a. Unless otherwise noted, bootstrap results are based on 5000 bootstrap samples

### Discussion

This study examined two relationships in order to determine if general anxiety does indeed moderate the association between callous-unemotional traits and the subscales of social reward, negative social potency and prosocial interactions. Prosocial interactions are conceptually associated with affiliative reward. Conversely negative social potency which involves deriving pleasure from the suffering of others, was also examined as it is conceptually opposed to prosocial interactions. Overall, the results indicate a positive association between CU traits and negative social potency, and a negative association between CU traits and Prosocial Interactions. Furthermore, anxiety had a significant effect on negative social potency but not on prosocial interactions. Anxiety did not moderate either of these associations.

The first aim of this study was to investigate whether anxiety moderated the association between CU traits and the degree to which prosocial interactions are valued as rewarding. CU traits were negatively associated with social reward perceived from prosocial interactions while anxiety was neither associated with prosocial interactions nor a moderator of this association. This reflects how generally, individuals high in these traits are less likely to value behaviours that promote positive social relationships as rewarding. These findings align with previous studies that found individuals high in CU traits have a reduced capacity for affiliative rewards and are less likely to value behaviours that promote positive social relationships (Waller & Wagner 2019). However, the lack of a moderating effect of anxiety does not align with previous literature that proposed anxiety could exacerbate the social deficits associated with CU traits and potentially worsen their impact on prosocial interactions (Kahn et al., 2016). This study's findings do not align with Kahns, implying that the relationship between CU traits and prosocial interactions is consistent across varying levels of anxiety. The near-significant interaction observed in this association indicates that although



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anxiety may have some influence on a person's valuing of prosocial interactions, it was not strong enough to significantly alter the association between CU traits and prosocial interactions. This finding aligns with past research that found it is the core components of CU traits, namely the lack of empathy and shallow affect that are the primary drivers of reduced prosocial behaviours rather than external factors such as one's anxiety levels (Essau et al., 2006).

This study also aimed to investigate whether and to what extent, anxiety moderated the association between callous-unemotional traits and negative social potency, with the hypothesis that CU traits would be related to negative social potency at higher levels of anxiety. Here, CU traits were associated with negative social potency, reflecting generally the tendency of individuals high in callous-unemotional traits to value manipulative social behaviours as rewarding and present with a shallow affect. These findings align with the existing literature that found that individuals high in CU traits tend to positively value negative social potency. The association between CU traits and negative social potency found in this present study aligns with the theoretical perspective that individuals high in CU traits exhibit a preference for negative social behaviours due to deficits in affiliative reward (Waller & Wagner 2019). This deficit leads them to derive pleasure from manipulating and dominating others rather than from positive social interactions. Furthermore, Anxiety was also a significant predictor of negative social potency, indicating that individuals value negative social potency more the higher the level of their anxiety. However, anxiety was found to not moderate the relationship between CU traits and negative social potency. These findings align with those of Kahn to some degree. His findings suggested that anxiety can influence social-emotional outcomes in individuals with CU traits (Kahn et al., 2016). While Kahn's findings focused on the moderating effect of anxiety on empathy, the findings of this study suggest that individuals with higher anxiety levels are more likely to find negative social potency as rewarding independently of their level of CU traits.

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These results are consistent with previous findings that CU traits are associated with a lack of sensitivity to social rewards (Foulkes et al., 2017). Furthermore, previous researchers described an inverted social reward mechanism that is commonly presented in individuals high in CU traits (Foulkes et al., 2017). This inverted social reward mechanism describes how these individuals tend to derive pleasure from negative social potency rather than prosocial interactions (Foulkes et al., 2017). The findings from this present paper reinforce this perspective.

Incorporating the Sensitivity to Threat and Affiliative Reward (STAR) model (Waller & Wagner 2019) allows for a deeper understanding of the functionality of callous-unemotional traits. This model states that these traits arise from deficits in both affiliative reward and threat sensitivity. The STAR model's emphasis on affiliative reward is especially relevant to this current study. Affiliative reward is conceptually associated with certain subscales of social reward, as affiliative reward is defined as the value, enjoyment and pleasure derived from close interpersonal bonds with others (Waller & Wagner 2019). This can be seen as conceptually associated with the social reward subscale of prosocial interactions. Furthermore, low affiliative reward specifically, is conceptually similar to negative social potency and for individuals with high CU traits, low affiliative reward reflects their reduced capacity to enjoy and engage in social bonding. This is conceptually similar to lower scores on Prosocial interactions and higher scores on negative social potency. The findings of this current study which accurately reflect the concept of low affiliative reward, is consistent with the predictions of the STAR model in that social reward seems to be associated with CU traits amongst young adults as well.

The findings presented in this paper support the current evidence and academic literature that CU traits are associated with an individual's affiliative reward. The current findings highlights the importance of considering affiliative reward in understanding the socialising abilities of individuals high in callous-unemotional traits. This would assist in

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constructing a more comprehensive framework for future exploration of how CU traits and social rewards are associated. Furthermore, the results of this study revealed the complex nature of the interplay of CU traits and anxiety in predicting how these individuals value specific types of social behaviours. The findings that anxiety potentially moderates prosocial interactions but not negative social potency postulates that future research regarding these associations should explore other potential mechanisms that may be at play behind each association. Moreover, This highlights the importance of addressing environmental factors and emotional regulation in interventions aimed at individuals with secondary CU traits. Reducing anxiety could mitigate the negative impact of secondary cu traits on socialising behaviours.

Moving on, the consistent close association between CU traits and the two social reward subscales coupled with a lack of a moderating effect of anxiety indicates that the primary and acquired variants do not differ in their association with social rewards. Conversely to the implications of the first model, these results reinforce the need for interventions that focus on emotional and affective deficits associated with primary CU traits rather than addressing external emotional states such as anxiety. Although there was no significant interaction for anxiety found in this present analysis, the results highlight the need for specified interventions that focus on enhancing affiliative rewards and reducing anxiety in order to improve prosocial behaviours amongst individuals who are high in CU traits.

### **Strengths and limitations**

#### ***Strengths***

This current paper has not been without its strengths and limitations. Firstly this study highlights the importance of investigating the role of general anxiety in the relationship between callous-unemotional traits and the perceived valuation of social rewards. By addressing this research gap, this study provides a detailed insight of how individuals high in

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CU traits perceive social rewards and thusly opens up valuable insight into their socializing behaviours. Furthermore, the use of validated and reliable questionnaires and measurements guaranteed that the constructs of interest were accurately measured. Thusly, the use of validated measurements enhanced the credibility and reliability of these findings. Lastly the utilization of bootstrapping in the analysis increased the robustness of the statistical analysis and increased the reliability of our results.

### *Limitations*

One of the main limitations of this study was the use of a convenience sample. Due to the sampling of 1<sup>st</sup> year psychology students rather than a general random sampling process meant that our sample may not have accurately represented the broader population . Future research should utilize an increased and more diverse sample size which would improve the reliability and generalizability of the study's findings. The reliance of self-reported measures limited the reliability of this study's findings. Participants may not provide accurate or honest responses to questions on self-reported measures which may thus limit the reliability of the measures. As such, future research may benefit from the use of behavioural observations or reports from close relationships. In addition, the current analysis concentrated on the potential moderating effect of general anxiety but did not distinguish between the many kinds of anxiety (generalized anxiety, agoraphobia etc) that are known to have varying effects on social behaviours (Tyrer, P., & Baldwin, D. 2006). While this current study utilized general anxiety to differentiate between the variants of CU future research and analysis should consider exploring other methods of specifying between primary and secondary CU traits to better investigate the differences in socializing abilities of individuals with different variants of CU traits. for instance using clustering methods to create groups based on different levels of anxiety. Future research would benefit from a more focussed demographic within the sample.

### **Conclusion**

The findings of this study confirmed an association between Callous-unemotional traits and the experience of social reward from both negative social potency and prosocial interactions contributed to past theories that investigated the differences in social reward evaluation between the different variants of Callous-unemotional traits. Although past studies have found these associations to diverge based on one's level of anxiety, this current study did not find anxiety to be a significant moderator, and found no support for differences between primary and secondary CU trait variants in terms of the perceived value of social rewards.

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## Appendix A

Figure 1

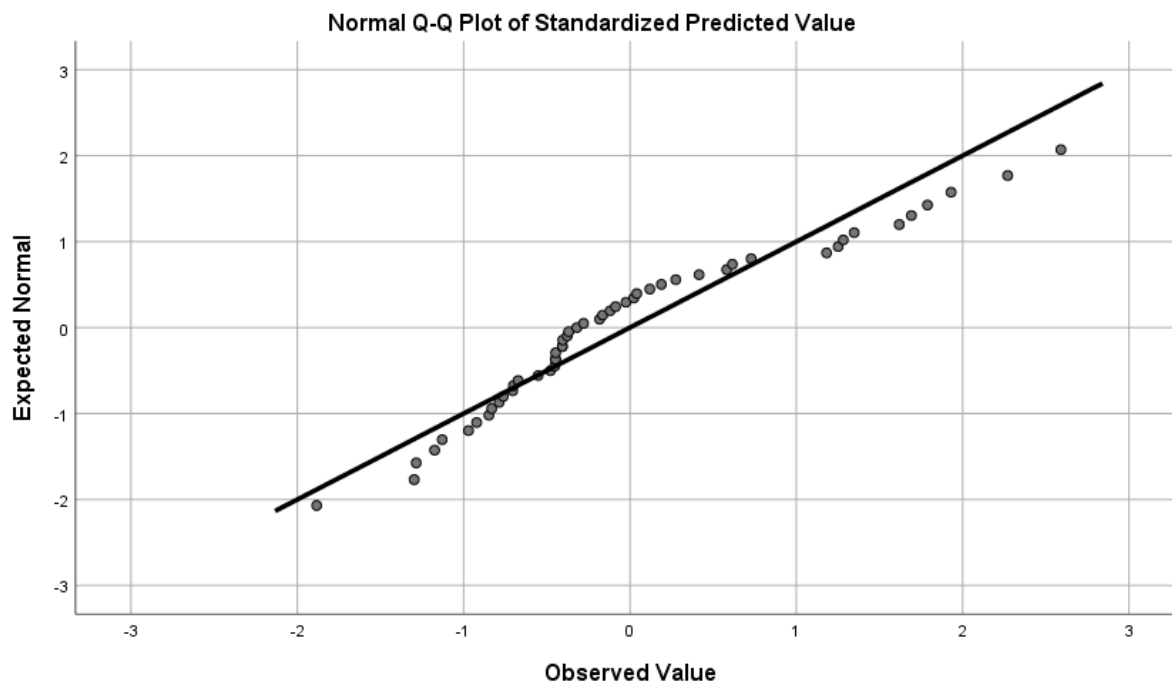
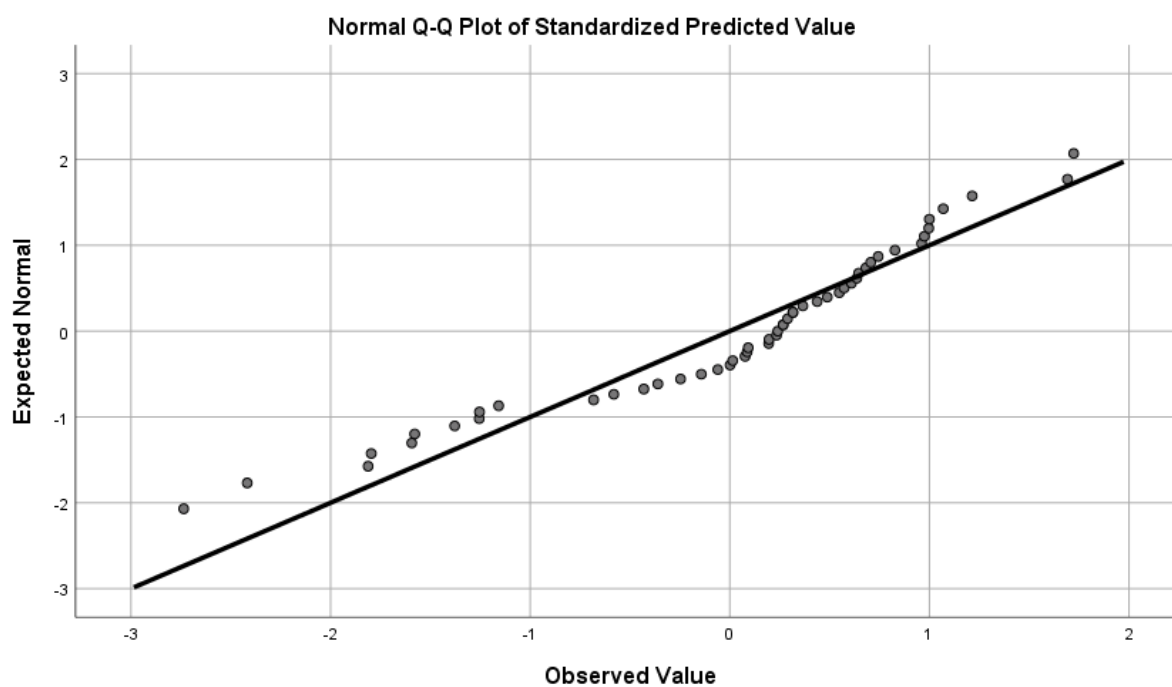
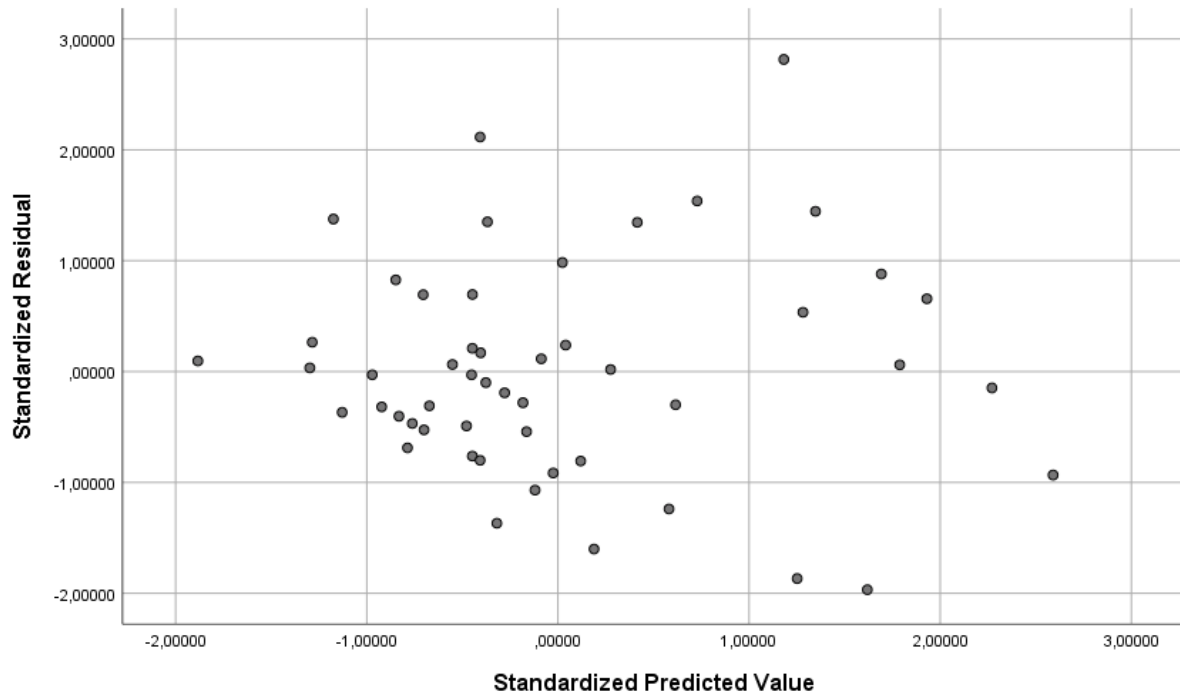
*Normality assessment model 1 (NSP)*

Figure 2

*Normality assessment model 2 (PROSOC)*

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**Figure 3***Assessment of linearity and homoscedasticity in model 1 (NSP)***Figure 4***Assessment of linearity and homoscedasticity in model 2 (PROSOC)*