The Effect of Gender and Social and Emotional Predictors on Academic Performance in Adolescence

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The Effect of Gender and Social and Emotional Predictors on Academic Performance

Non-cognitive predictors of academic performance such as social and emotional problems are documented to have a significant effect on academic performance outcomes in adolescents (Farrington et al., 2012). It is also reported that academic performance varies significantly between males and females as well as social and emotional behaviours (Leeson et al., 2008). Exploring the predictive effects of non-cognitive factors such as peer problems, emotional problems and pro-social behaviour between adolescent males and females on academic performance is critical to better understanding the effects that they may have on adolescent academic performance. Academic performance is correlated with a number of important quality of life predictors such as economic self-sufficiency, high-school completion, productivity, emotional health (Ng et al., 2015) and career outcomes (Kuncel et al., 2004). This highlights the importance of identifying the effects of these factors on academic performance, especially during adolescence in which children are at a critical point of transition between schooling and entering into adult world. Identifying these predictors and their effects on academic performance may contribute by providing information in which parents, teachers, students and the education system could use to maximise student academic potential. This study's focus on exploring differences in social and emotional factors effect on academic performance and gender may also provide insight into the gendered nature of social and emotional problems effect on academic performance and open the way for further research into the reasons for these gendered differences in outcomes. It will be to my knowledge among the first studies to explore social and emotional effects on academic performance of adolescents within the Longitudinal Study of Australian Children data

set and contribute to the currently limited collection of studies utilising National Assessment Program – Literature and Numeracy data within the Longitudinal Study of Australian Children data related studies.

Social Behaviour and Academic Performance

Farrington et al. (2012) describes social behaviours as one of the five most influential non-cognitive factors to predicting success beyond tertiary schooling and links two types of behaviours as the most pertinent influencers on academic achievement; pro-social behaviour and peer problems. Lewis et al. (2017) support this conclusion in a twin study that found that children exhibiting higher levels of pro-social behaviour had increased levels of academic performance while also taking into account the moderating effect of genetic and environmental factors. A study on Chinese school students found that levels of pro-social behaviour could also be a significant predictor of academic achievement (Guo et al., 2018), reporting general academic performance in adolescent students when pro-social behaviour was high. Pro-social behaviour has been observed to become more important as a child develops in relation to academic performance (Caprara et al., 2014) and interventions that aim to improve pro-social behaviour in students have produced significant increases in academic performance over time (Kilian & Kilian, 2011). This is however contradicted by DeVries, Rathmann & Gebhardt (2018) who found that peer problems and pro-social behaviour had less of a relationship to academic performance in later year levels than in earlier year levels. Pro-social behaviours effect on academic performance has been linked to its increase in other behaviours that increase academic performance such as study habits and classroom engagement (Farrington et al, 2012) as well as overall increases in emotional wellbeing, which is linked to higher

academic performance (Garcia et al., 2018). The literature suggests a positive correlation between pro-social behaviour and academic performance in adolescents.

Likewise with pro-social behaviour being correlated positively with academic performance, peer problems have had a consistently negative effect on academic outcomes. DeVries, Rathmann & Gebhardt (2018) found that peer problems had a more drastic effect on maths and reading competencies than positive pro-social behaviour. Ashley-Williams and Lawson (2015) study on peer problems effect on study habits reported that children high in peer problems were negatively correlated with positive study habits such as academic motivation and academic conscientiousness. Peer problems reported as the second most powerful non-cognitive negative predictor of overall adolescent academic performance in a study by García et al. (2018) only falling behind overall emotional problems in predictive power. Peer problems are a pertinent negative predictor of academic performance in adolescents.

Most studies researching peer problems and pro-social behaviours influence on academic performance only peripherally examines the differing effect between males and females. Guo, et al., (2018) identified that females had higher self-reported and peer reported pro-sociality but did not explore differences in effect differences between genders, instead reporting an overall positive difference in academic performance within their study population. Likewise DeVries, Rathmann & Gebhardt (2017) accounted for the moderating effect of gender on pro-social behaviour and peer problems in their methodology noting the gender imbalance in academic performance while not observing gendered differences in pro-social behaviour and peer problems effects on academic performance. Differences in pro-social behaviours expressions between genders are reported in the wider literature on pro-social behaviour in adolescents. Van der Graaf et al. (2018) found that pro-social behaviour

gradually increased throughout adolescence until the age of 16 in females and then slightly decreased into adult hood, while males were stable in pro-social behaviour levels until 14 and gradually increased in pro-sociality until they were 17. Lindemann et al. (1997) also found that female adolescents were more likely to employ pro-social behaviour to solve conflicts and problems than male adolescents. Furthermore, peer problems are expressed differently between genders as demonstrated by Washmann-Ormachea et al. (2004) study, which reported higher levels of peer problems amongst females, as well as a tendency for girls to be more argumentative, while male peer problems involving more physical altercations and threats. This study will contribute to understanding the differences in pro-social behaviour and peer problems effects accounting genders influence on academic performance and explore these gendered differences in non-cognitive academic performance predictors.

Emotional Problems and Academic Performance

Emotional problems are a salient negative correlational predictor on academic performance. Kantomaa et al. (2009) reported that higher levels of behavioural problems were associated with a decrease in academic performance across subjects and poorer future academic planning in adolescents. This trend of emotional problems having a negative correlation with academic performance is identified over a number of studies (Esienberg, Swanson & Valient, 2012). The influence of emotional problems on academic performance is especially pertinent as children experience an increase in overall emotional problems during adolescent development (MacCann et al., 2020). Adolescence is a critical point for study as more than half of all mental illnesses appears starting at the age of 14 and into young adulthood 20% of all adolescents reported experiencing some kind of mental illness (Kessler et al., 2007).

Emotional problems like pro-social behaviour express themselves differently between genders and occur at different rates. Emotional problems overall are higher in adolescent females than in males (Atkinson et al., 1998). Depression, anxiety and psychological distress also affect adolescent females at higher rates than they affect adolescent males (Faravelli et al., 2013). Coping strategies of dealing with emotional distress is also different between genders with girls more often utilising social support structures to alleviate stresses and negative mental health rates of females increasing as a result of less social support (Rudolph, 2002). Whether this will result in a significant change in how it alters academic performance between genders however is currently understudied and will be explored further in this study.

Effects on Academic Conscientiousness

Academic conscientiousness is a significant predictor of academic performance. Kappe & Flier (2012) assert that conscientiousness is the most important predictor of academic performance and is five times more accountable for variance in overall GPA scores of students than general intelligence. Leeson, Ciarrochi & Heaven (2008) found that changes in parenting styles for adolescents that resulted in a decrease in academic conscientiousness among students resulted in decreases in academic performance. Increases of conscientiousness have likewise been reported to correlate highly with increases in academic performance in students of all ages (Poropat, 2009). Conscientiousness levels also differ between male and female adolescents, with males having lower conscientiousness levels and trends suggest they become less disparate as males grow older to a similar level to their female peers (Bolle et al, 2015). Such a correlation highlights the reason why positive and negative predictors of conscientiousness should be identified in research pertaining to non-cognitive influencers on academic performance. Evidence has also

been found that suggests pro-social behaviour is correlated positively with higher general conscientiousness and peer problems and emotional problems as negative predictors (García et al., 2006). This study will explore the impact of emotional and peer problems as well as pro-social behaviours effect on academic conscientiousness between both male and female adolescents.

Cognition

Cognition is widely regarded as the strongest predictor of academic performance in current literature. Demitrou et al. (2020) found using a cognitive battery addressed to several domains including spatial, mathematical, casual and social reasoning that overall cognitive ability was a strong measure for predicting school performance in children and adolescents. Peng & Keivet (2010) highlight that cognition and academic performance are highly correlated and have similar predictive power for other future life predictions as well as sharing a bidirectional relationship with one another. Spatial memory, working memory and general reasoning ability is especially integral to academic performance (Aronen et al., 2005; Rohde & Thompson, 2007). As cognition is a pertinent predictor for academic achievement it will be a useful metric to compare non-cognitive predictors to.

Strength of Different Predictors on Academic Performance

The comparative importance of peer and emotional problems, pro-social behaviour, academic conscientiousness and cognitive ability will be compared in this study. This will be done to determine and compare the relative effects of each predictor to one another. It was expected that cognitive ability would be the strongest predictor in this study as it has been consistently reported as being the strongest overall predictor of academic performance (Rohde & Thompson, 2007; Furnham et al., 2009; Kuncel et al., 2004) and could be used as a metric to compare the non-

cognitive predictors to. General conscientiousness according to Kertechian (2018) is the strongest personality predictor of academic performance and academic conscientiousness was predicted to reflect this and contribute significantly to academic performance. Lewis et al. (2018) also reported that conscientiousness was correlated with greater academic performance as well as increases in brain grey matter volume. Pro-social behaviour was predicted to be a positive predictor, as increases were predicted to be connected with a lower presence of emotional and peer problems (Scourfield et al., 2004). Peer problems were reported by García et al. (2018) to be slightly less significant than emotional problems in academic predictive power.

Aims

Investigate the relationship of gender, peer and emotional problems effect on academic performance.

Investigate the effect of gender and pro-social behaviour on academic performance.

Investigate the effect of gender, peer and emotional problems on academic conscientiousness.

Investigate the relative importance of cognition, peer problems, emotional problems and academic conscientiousness on academic performance.

Method

Longitudinal Study of Australian Children

Growing up in Australia: the Longitudinal Study of Australian Children is a cross-sectional study that follows the development of 10,000 children and their families around Australia ("Growing Up in Australia: The Longitudinal Study of Australian Children", 2021). This study is separated into two cohorts – cohort B, which started collection at age 0-1 and cohort K, who started collection at age 4-5. Data collection started in 2004, being recorded sequentially every 2 years. The LSAC records several hundred different variables including socio-economic, social, psychological and health status and more, making it a comprehensive resource for study.

Measures

Strengths and Difficulties Questionnaire

The Strengths and Difficulties Questionnaire is a self-reported or peer-reported quantitative behavioural screening questionnaire developed for use by 4-17 year olds. The peer-reported version of the test is used in this study. The SDQ tests for 5 different scales, of which, pro-social behaviour, peer problems and emotional problems are used in this study. Each scale is measured from 0-10 with 0 being the lowest expression and 10 being the highest. Each scale possesses 5 items with answers ranging from not true, somewhat true to certainly true. The Strengths and Difficulties Questionnaire is reported to have satisfactory reliability and validity when used with adolescents (Goodman, Meltzer & Bailey).

SATI Persistence

The School Aged Temperament Inventory is a peer-reported quantitative test that assesses a range of different personality temperaments. As a metric for academic

conscientiousness the School Aged Temperament Inventory persistence score was used which assesses student persistence related to academic tasks. The test was scored by a parent of the participant and contains 4 items, rated on a 5 point Likert Scale. These items include questions on academic conscientiousness such as likely hood of completing assignments and persistence in continuing tasks despite interruption.

Groton Maze Learning Test

The Groton Maze Learning Test (GMLT) is a quantitative test that assesses processing speed, working memory, spatial reasoning and learning efficiency. The participant's score is calculated from their number of errors, with fewer errors representing higher cognitive ability and more errors representing lower cognitive ability in these areas. The Groton Maze Learning Test is used in this study as a measure of the general cognitive ability of the students.

National Assessment Program – Literacy and Numeracy

The National Assessment Program – Literature and Numeracy (NAPLAN) is an academic assessment that is conducted in years 3, 5, 7 and 9 for all students in Australia. The sample that is used in this study participated in the year 9 test. The NAPLAN offers a robust assessment of a student's competency in a range of core academic factors, including numeracy, writing, spelling, reading and grammar and punctuation. As a measure of overall academic competency all scores across these tests were combined into a single sum. This is viable as all scores across the NAPLAN tests are weighted equally and use the same total range of between 0 and 400. This total score represents the participant's academic performance in this study.

Sample

The sample used in this study were children aged 14-15 who had taken the NAPLAN test in the year 2014 from cohort K, Wave 6 of the Longitudinal Study of

Australian Children. This sample was restricted to students who participated in the 2014 NAPLAN to pair the students with the nearest date of collection for the Strengths and Difficulties Questionnaire, School-Age Temperament Inventory and Groton Maze Learning Test and avoid using older NAPLAN data that may no longer be indicative of the participant's academic performance ability. Students who had not participated in all the test measures were excluded from the study. There were 942 female and 961 male participants in this sample for a total of 1903 participants. Gender was coded in a binary way in the data, with 0 assigned to males and 1 assigned to females.

Results

Table 1

Description of Data

Variable	*Mean*	*SD*	*Min*	*Max*	*Skew*
Cognition	52.01	19.15	0	232	1.95
Pro-Sociality	8.12	1.81	1	10	-0.98
Peer Problems	1.44	1.61	0	8	1.25
Emotional Problems	1.81	1.90	0	10	1.33
Conscientiousness	3.72	0.83	1	5	-0.58
Academic Performance	2993.35	305	1723	3977	-0.04

Description of data

A summary of the data (Table 1) found that peer and emotional problems were low, with peer problems having a mean of 1.44 and emotional problems having a mean of 1.81. Pro-sociality was high, having a mean of 8.12. The standard deviation was small amongst all variables with exception of cognition. Peer problems never exceeded 8, however the other Strengths and Difficulties Questionnaire related variables, emotional problems and pro-sociality reached their maximum value. Pro-sociality did not report a minimum score of 0 while all other Strengths and Difficulties Questionnaire related scores did. Cognition had a high positive skew at 1.95 indicating cognition (cognition was measured using total mistakes in the Groton Maze Learning Test) was skewed towards more mistakes and lower cognition. Peer problems and emotional problems also possessed a high positive skew at 1.25 and 1.33 respectively, despite overall mean scores being low. Pro-sociality had a high

negative skew at -0.98. Conscientiousness had a moderate skew of -0.58 and academic performance was mostly symmetrical with a -0.04 negative skew. This shows a low level of symmetry within the overall data set making a majority of the variable data not normal.

Table 2

Correlation Co-efficient and Significance of Data

Variables	*1*	*2*	*3*	*4*	*5*	*6*	*7*
1.Gender	_						
2.Pro-sociality	0.18***	-					
3. Academic Conscientiousness	0.26***	0.33***	-				
4.Peer Problems	-0.05*	-0.28***	-0.25***	-			
5.Emotional Problems	0.15***	-0.18***	-0.22***	0.45***	-		
6.Cognition	0.01	-0.09	-0.09***	0.06***	0.10***	-	
7.Academic Performance	0.14***	0.10***	0.44***	-0.12***	-0.14***	-0.17***	-

* p< 0.05, **p<0.01, ***p<0.001

Correlation Analyses

The correlation analyses and the corresponding significance of the data variables can be found in Table 2. A moderate and statistically significant positive correlation was found between peer problems and emotional problems. Academic Conscientiousness and Academic Ability also shared a statistically significant and moderate correlation. Academic Conscientiousness was the strongest variable to positively correlate with Academic Ability and cognition was the strongest negative correlation. All other variables possessed statistically significant but weak positive and negative correlations with one another, with the exception of pro-sociality and

peer problems, which show a moderate statistically significant negative correlation with one another. Pro-sociality and Academic Conscientiousness showed low statistical significant negative correlations with Peer Problems, Emotional Problems and Cognition. Gender had a moderate correlation and statistically significant correlation with Academic Conscientiousness, meaning females to higher overall conscientiousness. Gender and cognition have the lowest overall correlation to one another of all variables and are not statistically significant. Gender correlated negatively with peer problems very mildly and statistically significantly and was also mildly correlated positively and very statistically significantly with emotional problems, which means females were slightly higher in emotional problems than males.

Table 3

Multiple Linear Regression Analyses of Gender, Peer Problems and Emotional Problems on Academic Performance

Variable	*t*	*p*	β	*f*	*DF*	*R2*
Overall Model		<. 0.001		32.21	1899	0.048
Gender	6.99	<. 0.001	0.16			
Peer Problems	-7.88	<. 0.10	-0.04			
Emotional Problems	-23.88	<. 0.001	-0.14			

Table 4

Multiple linear Regression Analyses of Gender and Pro-social Behaviour on Academic Performance Results

Variable	*t*	*p*	β	*f*	*DF*	*R2*
Overall Model		<. 0.001		23.98	1899	0.02
Gender	5.48	<. 0.001	0.12			
Pro-social Behaviour	3.17	<. 0.001	0.07			

Table 5

Relative Importance and Multi Linear Regression Results of all Variables on Academic Performance

Variable	*t*	*p*	β	*F*	*DF*	*R2*	*RI*
Overall Model		<. 0.001		87.13	1896	0.21	
Gender	2.39	0.01	0.05				0.05
Peer Problems	0.28	0.77	0.006				0.01
Emotional Problems	-2.44	0.01	-0.05				0.04
Pro-Social Behaviour	-2.97	0.003	-0.06				0.02
Academic Conscientiousness	18.66	<. 0.001	0.42				0.76
Cognition	-6.22	<. 0.001	-0.12				0.09

Multi-Linear Regression Analyses and Relative Importance (Academic Performance)

To further explore the relationships between the variables and their influence on Academic Performance a series of multiple regression models was performed as well as a relative importance analysis on all the variables on Academic Performance.

The first of these multiple regression analyses is represented in Table 3, which displays the multiple regression results for Gender, Peer Problems and Emotional Problems on Academic Ability. Overall the model only contributed a small proportion of overall variance on Academic Performance, however it was highly significant. Emotional Problems and Peer Problems both had a small negative effect on overall academic performance, with peer problems having the largest negative value of standardised β at -0.14 compared with Peer Problems standardised β of -0.004. Peer problems also had lower significance than the other variables, though it was still highly significant. Gender had a small positive standardised β of 0.16 and t value of 6.99 when paired with the two negative predictors which means females have higher Academic Ability than men when affected by the two negative contributors. This demonstrated a very small but significant effect of Gender, Peer Problems and Emotional Problems on Academic Conscientiousness, with Emotional Problems significantly overshadowing Peer Problems in its negative predictive power.

To assess the effect of Gender and Pro-Social variables on NAPLAN a multiple regression model was used which is displayed in table 4. The overall model had a low variance on Academic Performance results with an R Square of 0.02 although it was highly significant. Both Gender and Pro-Social Behaviour had a small positive effect on academic performance, with Gender being the more significant of the two variables possessing a β of 0.12 compared to a standardised β of 0.07 for Pro-

Social behaviour, which attributes a higher female Academic Ability score. Pro-Social behaviour and Gender had only a small direct effect on Academic Performance.

A multi linear regression model was made paired with a relative importance analysis using all variables as independent variables and Academic Performance as the dependent variable (Table 5). This model showed a 21% contribution to total variance and was very statistically significant. The most important contributor to overall variance was Academic Conscientiousness making up more than 76% of the total contribution to variance, followed by Cognition at 9% and than Gender at 5%. Of the other non-cognitive predictors Peer Problems only contributed 1% of total variance and Emotional Problems and Pro-Social behaviour contributing relatively little as well. Peer Problems was not statistically significant, however all the other variables were significant. Academic Conscientiousness, reflecting its high importance had the largest β value at 0.42 as well as the highest t value and cognition had the highest negative correlation. Otherwise positive predictor pro-social behaviour produced a negative β value of -0.06 due to suppression effects from conscientiousness and a reversal of peer problems to a small positive β of 0.006 due to the suppression effect of Emotional Problems correlation with Peer Problems. This analysis suggests that Academic Conscientiousness is the most impactful predictor on Academic Performance of all variables by a significant margin, eclipsing much of the importance of all the other variables and all variables are responsible for under a quarter of total variance.

Table 6

Multiple linear Regression Model of Gender, Peer Problems and Emotional Problems on Academic Conscientiousness Results

Variable	*t*	*p*	β	*f*	*DF*	*R2*	*RI*
Overall Model		<. 0.001		114.5	1899	0.15	
Gender	13.06	<. 0.001	0.28				0.47
Peer problems	-5.92	<. 0.001	-0.14				0.26
Emotional problems	-8.39	<. 0.001	-0.20				0.27

Multi-Linear Regression Analyses and Relative Importance (Academic Conscientiousness)

As Academic Conscientiousness had a high correlation with Academic Performance, the relationship between the negative predictor variables and academic conscientiousness was explored using a multiple regression analyses paired with a relative importance analyses on Gender, Peer and Emotional Problems, which is displayed in Table 6. Overall the model accounted for 15% of total variance and had very high statistical significance. Of the 15% of variance contributed by the model, almost half of it was accountable to Gender (Females having higher Academic Conscientiousness) and Peer Problems and Emotional Problems roughly accounting for the other half of importance with slightly more importance being attributed to Emotional Problems. All variables were significant, with emotional problems having the most negative effect with a standardised β of -0.20 compared to Peer Problems

and standardised β of -0.14. This indicates that Emotional and Peer Problems have a small but overall effect on Academic Conscientiousness levels.

Discussion

The main goal of this study was to examine the relationship of non-cognitive predictors and gender with academic performance. Of all the non-cognitive predictors of Academic Performance, Academic Conscientiousness was the most influential and had the strongest correlation with Academic Performance, even more so than cognitive ability, which was unexpected as it was predicted that Cognition would be the strongest predictor. This is consistent with Kappe & Flier (2012) findings that reported that overall conscientiousness is the strongest predictor of academic performance. The results of the analyses did however highlight that Cognition, while lacking in overall importance compared to Academic Conscientiousness, still had more effect on academic performance than the non-cognitive behavioural factors of Emotional Problems, Pro-social behaviour and Peer Problems. Multiple regression analyses further highlighted the different effect that negative predictors like Emotional Problems and Peer Problems and positive predictors like Pro-social Behaviour had when paired with Gender, suggesting Peer Problems was unsubstantial in effecting Academic Performance comparatively to Emotional Problems. Pro-social Behaviour had a small overall effect on Academic Performance but correlated moderately with Academic Conscientiousness and reduced negative predictors. Concerning the influence of gender, females performed better than men academically and correlated higher than males on all positive predictors and lower in all negative predictors besides Emotional Problems. These results will be explored and discussed in further detail below.

The analyses in this study provided further insight on the effects of Gender, Peer Problems and Emotional Problems on Academic Performance. The mild correlation of females with Emotional Problems was supported by the Attkinson et al.

(1998) findings that reported that emotional problem levels were higher in female adolescents than in male adolescents. This could be the role of social pressures (Mrug et al., 2013) or associated with commonly caused biological changes during adolescence (Tayebi et al., 2020). Emotional problems was also a more significant influence on lowering Academic Performance comparatively with Peer Problems, this is consistent with the Sanchez-Garcia et al. (2018) findings that Peer Problems was less significant than Emotional Problems, however, the negative effect of Emotional Problems and Peer Problems was not as influential on academic performance as in that study - this may be due to the larger sample size used in this study. It is unsurprising that Peer Problems, Pro-social Behaviour and Emotional Problems were moderately correlated with one another as they are widely reported as being interrelated co-variables in the literature and compound with each other (Scourfield et al., 2004). Potential causation for these decreases in academic performance could be attributed to the effect of poor social relations and friend groups negatively effecting learning (Schwartz et al., 2007) in the case of Peer Problems and in the case of Emotional Problems, the effect of anxiety, depression and other mood effecting disorders negative effect on academic performance (Owens et al., 2012). Overall, Peer and Emotional problems effects while small followed the predicted trend of a negative effect on academic performance.

Pro-social Behaviour had the lowest overall direct predictive power of all the Strengths and Difficulties Questionnaire measure based variables on Academic Performance but was correlated moderately with the most significant predictor Academic Conscientiousness. Pro-social behaviour was mildly correlated with Gender, which is consistent with Van der Graaf, et al. (2018) and Russel et al., (2003) who report more expression of pro-social behaviour in female adolescents. This may

be due to gendered socialisation of girls to behave pro-socially (Mrug et al., 2013: Rudolph, 2002). Pro-social Behaviour however had very little effect on Academic Performance directly, with only a small positive influence being present that was eclipsed by the effect of Gender and Academic Conscientiousness in multiple regression analyses. Despite this, Pro-social Behaviours moderate positive correlation with academic conscientiousness and reduction of the negative predictors of Peer Problems and Emotional Problems indicates that it had reductive effects on behaviours associated with poor academic performance. This adds further weight to the Farrington et al., (2012) conclusion that pro-social behaviour may have an effect on improving overall wellbeing and school engagement, which in turn improves academic performance outcomes. This outcome in the analyses supports that pro-social behaviour is important in facilitating academic performance enhancing behaviours, which would substantiate Capara et al. (2014) study that reported interventions in adolescents that promoted pro-social behaviour had a positive effect on academic outcomes. Pro-social Behaviours co-variable relation with positive and negative predictors is the likely explanation for its positive relationship with academic performance.

Academic Conscientiousness was the most influential predictor of all non-cognitive predictors and unexpectedly eclipsed the importance of Cognition by a significant margin. Academic Conscientiousness and its effect on academic performance seen in this study are reminiscent of the results and conclusions reported by Andersen et al. (2020). Andersen et al. (2020) found in a 100,000 participant sample study that conscientiousness was a stable and significant personality metric in predicting academic performance through childhood and adolescence and that agreeableness and emotional stability predominantly reflected their correlations

through a connection with conscientiousness. The interrelations between Academic Conscientiousness, Peer Problems and Emotional Problems repeat a similar pattern with Emotional Problems and Peer Problems supplementing agreeableness and emotional stability from that study. This is likely the predominate reason why their is as a small to moderate correlation between increased Peer Problems and Emotional Problems with lower total academic conscientiousness. Academic conscientiousness significantly overshadowing cognitions effect on cognitive performance could be attributable to a number of reasons. This could be the result of the Groton Maze Learning Test specifically targeting learning efficiency, processing speed, working memory and spatial reasoning skills in a more narrow capacity than a broader measure of intelligence like IQ, which could be more reflective of overall cognitive function in relation to academic tasks. Another explanation could be that, like many other studies have shown (Heaven et al., 2002; Kappe & Fliers, 2012; Andersen et al., 2020) conscientiousness is simply powerful predictor of academic performance and when localised to specifically conscientiousness related to academic performance this predictive power and significance is amplified. The increased level of academic conscientiousness in females is supported by the wider literature on conscientiousness in adolescence, which shows a strong trend towards higher conscientiousness levels in females over males (Bolle et al, 2015, Vechionne et al., 2012). Overall academic conscientiousness was the most important predictor of academic performance.

Some limitations in this study were the low level of variance that were found for all the predictor variables used, which was around 21% of all variance, with 76% of that being attributed to Academic Conscientiousness. The large degree of variance absent in the study could be a result of the lack of a more robust predictor of general intelligence such as IQ or a more diverse set of cognitive measures. The low influence

of the Strengths and Difficulties Questionnaires based variables of Peer Problems, Emotional Problems and Pro-social Behaviour could also be a result of the limited scope of items used in the individual Strengths and Difficulty Questionnaire sections and their self reported nature, which is prone to exaggeration, generalisation and extrapolation. Supplementing them with a more robust measure for Emotional Problems, Peer Problems and Pro-social behaviour that is peer-reported could help alleviate this. Further control of the sample used taking into account environmental circumstances (socio-economic status, mode of schooling) and other factors like student behaviours (school attendance) and mental illness could strengthen the validity and scope of the study.

Conclusion

In summary, Academic Conscientiousness is a significant non-cognitive factor that can have more influence than pure cognitive ability. Peer and Emotional Problems correlate negatively with academic performance likely by decreasing pro-sociality which in turn lowers academic conscientiousness levels. Females possess academic performance increasing predictors at higher levels, which contributes to greater female academic performance than males. This study supports much of the conclusions current literature on adolescence and non-cognitive predictors and highlights the importance of academic conscientiousness in academic performance outcomes. This information allows for the development of potential strategies that can improve academic performance in adolescents, such as creating practices targeting and attempting to improve academic conscientiousness and creating learning environments that facilitate pro-social behaviour. Further studies could focus on exploring other variables that contribute to academic conscientiousness to expand on these findings and use more robust measures for behavioural and emotional factors to

see if they are more important. It is also important to note when interpreting the results of this study the limited variance some variables, especially Peer Problems and Emotional problems had on Academic Performance. This study ultimately reifies the significance of student conscientiousness and persistence in application to study, as well as the importance of strong mental and social health's positive influence on adolescent academic performance.

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