A retrospective examination of antisocial and risk-taking behaviours

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Engagement in antisocial and risk-taking behaviours is a recurring issue that has been associated with a range of negative outcomes for the individual, community, and society. This research explored factors that influenced engagement and co-occurring behaviours. Responses ($n = 393$) from an Australian sample who completed the Antisocial Engagement Questionnaire showed that the majority of the behaviours of interest were associated, indicating that engagement in one behaviour was associated with engagement in additional antisocial and risk-taking behaviours. Engagement in antisocial behaviours was also associated with increased substance consumption. An investigation into the associations between 15 substance-related behaviours found that use of one substance was associated with the use of additional substances. The findings have implications for understanding the development of an antisocial lifestyle, the associations between behaviours, the findings build on research relating to behaviour prediction and will assist clinicians working with at-risk individuals and intervention design.

KEYWORDS: antisocial behaviour; behaviour prediction; co-engagement; poly-substance use; risk-taking.

Antisocial and risk-taking behaviours (ARTBs) were defined as engagement in behaviours that disregard social norms or compromise an individual's health or well-being (*Diagnostic and Statistical Manual of Mental Disorders–Fifth Edition, DSM–5*; American Psychiatric Association, 2013; Hemphill et al., 2011; Horner et al., 2012). Engagement in multiple ARTBs by an individual has been recorded in the research literature (Dembo et al., 2013; Lowry et al., 1999; Rew, Horner, & Brown, 2011). Despite this documentation, previous research has restricted its focus to a small number of antisocial behaviours and substance-related behaviours, and, consequently, this research aims to further our understanding of co-occurring antisocial and risk-taking behaviours. Previous research has

found strong associations between smoking cigarettes and the consumption of additional substances, engagement in physical violence, disorderly behaviour, and lower academic performance (Horner, Rew, & Brown, 2012; Lowry et al., 1999; Mathers, Toumbourou, Catalano, Williams, & Patton, 2006). A European study, reporting findings from 25 countries, found that there were strong associations between alcohol consumption and engagement in ARTBs, such as violence and property damage (Gatti et al., 2013). This co-occurring engagement was also found in an Australian study by Agius, Taft, Hemphill, Toumbourou, and McMorris (2013) where in a sample ($n = 450$) of Year 11 students, half of the students who had experienced sexual intercourse had also engaged in binge-

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drinking-related behaviours. The consumption of cannabis has also been associated with the consumption of other illicit substances, physical violence, and lower academic performance (Scholes-Balog, Hemphill, Patton, & Toumbourou, 2013). Another behaviour with similar associations is the act of carrying a weapon. Carrying a weapon has been linked to a range of ARTBs, such as physical violence, substance use and property damage (Horner et al., 2012). Similarly, the act of school truancy has been linked to increased substance use, decreased academic performance and early departure from education settings (Buscha & Conte, 2014; Dembo et al., 2013; Flannery, Frank, & Kato, 2012; Kim & Page, 2013; Vaughn, Maynard, Salas-Wright, Perron, & Abdon, 2013). Furthermore, in a population of detainees in Footscray, Australia, 80% tested positive for substance consumption, again supporting the association between engagement in ARTBs and engagement in substance-related behaviours (Ng, 2014).

Research also indicated that engagement in substance use, theft, vandalism, physical violence and risky sexual practices has a tendency to co-occur (Agius et al., 2013; Horner et al., 2012; Horton, Ellison, Loukas, Downey, & Barrett, 2012; Lier, Vitaro, Barker, Koot, & Tremblay, 2009; Mensch & Kandel, 1988; Wechsler, Dowdall, Davenport, & Castillo, 1995). As previous research into engagement in and the co-occurring nature of antisocial behaviours and substance-related behaviours is restricted, additional research is required to further our understanding of the relationships between less researched ARTBs. The documented associations between the previously explored ARTBs imply that engagement in one ARTB increases the likelihood that an individual will then engage in other ARTBs (Dembo et al., 2013). Therefore, it could be deduced that a reduction of engagement in one ARTB could reduce engagement in other ARTBs (Dembo et al., 2013), making it essential that clinicians are aware of the co-

occurrence of engagement when working with individuals who engage in ARTBs. As a result, the exploration into the concurrent relationships between ARTBs is warranted.

There is a pre-existing notion that the use of one substance increases the likelihood that an individual will consume other substances (Scholes-Balog, Hemphill, Reid, et al., 2013; Torabi, Jun, Nowicke, Seitz de Martinez, & Gassman, 2010; Weitman, Scheble, Johnson, & Abvey, 1972; White et al., 2013; Zhao & Harris, 2004). For example, the consumption of cannabis has been found to be strongly associated with the consumption of tobacco, cocaine and other illicit substances (Scholes-Balog, Hemphill, Patton, & Toumbourou, 2013; Torabi et al., 2010; Weitman et al., 1972; Zhao & Harris, 2004). Consistent with this view is the finding that in 2013, 40% of Australians surveyed had engaged in poly-substance use (AIHW, 2014). As the mechanisms that underpin poly-substance usage are yet to be explored across a range of substances, it is important that the co-occurring nature of substance usage is investigated (AIHW, 2014; White et al., 2013).

Explanations for the associations between multiple ARTBs have been theorised. Gatti et al. (2013) maintained that engagement in one form of antisocial behaviour or substance use was associated with engagement in another and devised several explanations for this association. The first explanation suggested that the psychopharmacological elements in substance use lead to engagement in ARTBs. Second, Gatti et al. (2013) stated that the consumption of substances is a by-product of the lifestyle associated with engagement in ARTBs. The final explanation provided by Gatti et al. (2013) suggested that substance use and engagement in ARTBs are associated in a bi-directional manner and, as a result, have a tendency to exacerbate one another. This means that the consumption of substances is a risk factor of engagement in ARTBs, just as engagement in ARTBs increases an individual's risk of substance consumption (Gatti

et al., 2013). Further research is warranted to examine these assertions. However, Gatti et al.'s (2013) explanations are consistent with the contention that engagement in antisocial behaviour and substance use is complex and often concurrent (Lowry et al., 1999; Rew et al., 2011). As exploring the relationships between ARTBs has important implications for reducing engagement in ARTBs, understanding poly-substance use, working with at-risk youth and the development of intervention programmes, it was important to explore the associations between ARTBs (Dembo et al., 2013). Therefore, this research explored the associations between 45 behaviours of interest.

Research hypotheses

1. It was expected that correlations would be found between the majority of the ARTBs of interest, implying that engagement in one ARTB increases the likelihood of engagement in other antisocial acts.
2. It was also anticipated that the findings would support the notion that the consumption of one substance increases the likelihood of consuming other substances.

Method

Participants

A convenience sample ($n = 393$) of Australians was recruited and presented with the items of the Antisocial Engagement Questionnaire (AEQ) in addition to demographic questions. The sample was diverse with the participants' ages ranging from 18 to 74 years. Although varied, this was predominantly a young sample with 41.1% of the participants aged between 18 and 24 years and 21.6% aged between 25 and 34 years. The sample was evenly split between males (53.2%) and females (46.8%). The education history of the participants was wide ranging. A smaller number of the respondents had

completed Year 9 (1.0%), Year 10 (5.3%) and Year 11 (5.9%), with a larger portion reporting graduating from secondary school (20.1%). The majority of the sample were university graduates (47.6%), with a smaller portion of the sample reporting partial completion of a university course (first year of university 7.6%, second year of university 8.1% and third year of university 4.3%).

Materials

The Antisocial Engagement Questionnaire

The AEQ was adapted from the Self-Report Delinquency scale (SRD) devised by Elliot and Ageton (1980; Brindle, Bowles, & Freeman, *Forthcoming*) and national crime surveys to create a retrospective measure that assesses engagement in 45 ARTBs. The AEQ measures engagement in antisocial behaviours (e.g., skipping school, minor infringements, theft, sexual assault) across 22 items, substance-related behaviours (e.g., the ingestion of alcohol to excess, methamphetamines, and hallucinogens) across 15 items, and any social problems experienced as a result of engagement in ARTBs (e.g., missing work, legal problems, or interpersonal problems) across 8 items. The items of the AEQ are retrospective in nature and require the respondent to indicate their frequency of engagement. The response set consists of frequency categories such as; *never, once or twice, three or four times, five or six times, and more than six times*. These frequency scores, in conjunction with the severity weightings allocated to each item, allow users to calculate the AEQ Total Score and individual item scores. Investigations into the psychometric properties of the AEQ found that the AEQ has good internal reliability, content validity and face validity. The AEQ is cost effective, easy to administer, and linguistically simple, and increases the participant's sense of confidentiality due to its self-report format. The time required to complete the AEQ is 20 minutes.

Procedure

The sample completed the AEQ in addition to demographic information. Each participant was provided with information regarding the purpose of the study, confidentiality, and consent through a plain language statement and consent form prior to participation. In addition, a debriefing statement was also provided to the respondents at the completion of their participation. The confidentiality and anonymity of the respondents were maintained at all times.

Results

An investigation was conducted to examine any associations between the ARTBs assessed through the AEQ. The Pearson product-moment correlation (Pearson's r) was used to assess the strength and direction of the linear relationships between the variables. The inter-correlations between the AEQ items are contained in Tables 1, 2, 3, 4 and 5. In addition, Figures 1, 2 and 3 are graphical representations of some selected statistically significant correlations ($r \leq .50$, $p \leq .001$) between the AEQ items.

The contents of Table 2 indicated that the items relating to engagement in ARTBs were, for the most part, significantly correlated. These correlations ranged from $<.1$ to $.61$, indicating that the items were low to moderately correlated with one another (Sattler, 2008). As an adequate linear relationship was found between the items this implied that engagement in one antisocial behaviour was associated with engagement in other antisocial behaviours. There was some variation in the findings, with some items demonstrating stronger correlations. For example, the relationships between committing minor infringements (Item 22) and being disorderly in public (Item 3; $r = .50$, $p < .001$), between shoplifting (Item 13; $r = .50$, $p < .001$) and vandalism (Item 14; $r = .62$, $p < .001$), and between threatening to hit an individual of authority (Item 18) and Item 19 hitting a person of

authority (Item 19; $r = .63$, $p < .001$) were strong and statistically significant. Figure 1 is a graphical representation of a selection of some of the stronger relationships between the antisocial behaviours.

A statistically significant linear relationship was also found between the items that concerned an individual's substance-related behaviour with the exception of the association between consuming alcohol to excess (Item 1) and intravenous illicit substance use (Item 15; see Table 3). The correlations between these items ranged from $<.1$ to $.76$, indicating that the items were low to moderately correlated with one another. Some of the correlations contained in Table 3 were stronger than others, indicating a stronger association. Strong statistical relationships were found between consuming tobacco (Item 2) and consuming marijuana (Item 3; $r = .76$, $p < .001$), consuming marijuana (Item 3) and consuming hallucinogens (Item 4; $r = .72$, $p < .001$), consuming marijuana (Item 3) and consuming amphetamines (Item 6; $r = .70$, $p < .001$), and consuming hallucinogens (Item 4) and consuming amphetamines (Item 6; $r = .83$, $p < .001$). Other associations, although statistically significant, were weaker in association. For example, consuming alcohol to excess (Item 1) and consuming heroin (Item 8; $r = .11$, $p < .05$), consuming alcohol to excess (Item 1) and consuming crack (Item 9; $r = .13$, $p < .001$), and consuming tobacco (Item 2) and consuming crack (Item 9; $r = .19$, $p < .001$), although statistically significant, were weaker in association than other associations between the substance-related behaviours.

The correlations displayed in Table 4 indicated that statistically significant correlations were found between the items that measure an individual's experience of social problems as a result of their engagement in ARTBs. The correlations between the items ranged from $.23$ to $.65$. Some of the associations found between the items were stronger than others, such as between selling marijuana (Item 1) and selling

Table 1. Item key: Antisocial Engagement Questionnaire.

Item no.	AEQ item content key
<i>Antisocial behaviour</i>	
1	Have you ever avoided paying for things such as movies, bus, train, and/or food?
2	Have you ever been drunk in a public place?
3	Have you ever been loud, rowdy, disorderly, or unruly in a public place?
4	Have you ever stolen or tried to steal a motor vehicle such as a car or motorcycle?
5	Have you ever carried a weapon other than a plain pocketknife?
6	Have you ever used or tried to use credit cards without the owner's permission?
7	Have you ever made obscene telephone calls (such as calling someone and saying dirty things)?
8	Have you ever snatched someone's purse or wallet or picked someone's pocket?
9	Have you ever purposely set fire to a building, car, or other property?
10	Have you ever broken into a vehicle or building to steal something?
11	Have you ever used a fake form of identification?
12	Have you ever skipped school (truancy)?
13	Have you ever stolen an item from a shop?
14	Have you ever vandalised any property?
15	Have you ever attacked someone with the intent of seriously hurting or killing the person?
16	Have you ever deliberately injured your spouse/girlfriend/boyfriend (e.g., hit, knocked down, choked, beat, and/or cut them)?
17	Have you ever had or tried to have sexual relations with someone against their will?
18	Have you ever threatened to hit one of your parents or teachers or person of authority?
19	Have you ever hit one of your parents or teachers or person of authority?
20	Have you ever used force or strong-arm methods to get money or items from someone?
21	Have you ever been involved in a physical fight?
22	Have you ever committed minor infringements such as having your feet on the seat while on public transport or smoking in areas in which it is prohibited?
<i>Substance-related behaviour</i>	
1	Have you ever consumed alcoholic beverages, beer, wine, and/or hard liquor to excess?
2	Have you ever consumed tobacco?
3	Have you ever consumed marijuana or hashish (grass, pot, or hash)?
4	Have you ever consumed hallucinogens such as LSD, acid, peyote, mescaline, and/or psilocybin (mushrooms)?
5	Have you ever consumed tranquilisers such as valium, librium, thorazine, miltown, equanil, and/or meprobamate?
6	Have you ever consumed amphetamines such as uppers, speed, pills, ecstasy, dexedrine, benzedrine, and/or dexies?
7	Have you ever consumed barbiturates, downers, and/or sleeping pills?
8	Have you ever consumed heroin (junk or smack)?
9	Have you ever consumed crack?
10	Have you ever consumed crack cocaine?

(Continued)

Table 1. (Continued).

11	Have you ever consumed inhalants such as glue, paint, nangs, and/or aerosol strays?
12	Have you ever consumed methamphetamines?
13	Have you ever consumed any other non-prescription drugs?
14	Have you ever consumed drugs prescribed for you by a doctor more often and/or in greater amounts than was prescribed?
15	Have you ever injected an illicit drug through the skin or into a vein?
<i>Social problems</i>	
1	Have you ever sold marijuana or hashish to friends or strangers?
2	Have you ever sold hard drugs such as heroin, cocaine, methamphetamines and/or LSD to friends or strangers?
3	As a result of your substance use, have you been in trouble with a friend or husband or wife or partner or teacher or family member/s?
4	Have you been in physical fights as a result of your substance use?
5	Have you experienced problems with your physical health as a result of your substance use?
6	Have you had an accident while driving as a result of your substance use?
7	Have you missed work or called in sick as a result of your substance use?
8	Have you ever had problems with the law as a result of substance use?

Note. AEQ = Antisocial Engagement Questionnaire.

hard drugs (Item 2; $r = .65, p < .001$), engaging in physical fights as a result of substance use (Item 4) and having an accident while driving under the influence (Item 6; $r = .51, p < .001$), and experiencing problems with the law as a result of substance use (Item 8) and engaging in physical fights as a result of substance use (Item 4; $r = .53, p < .001$). It was also noted that no association was found between having an accident while driving as an outcome of substance use (Item 6) and selling marijuana (Item 1; $r = .23, p < .001$), selling marijuana (Item 1) and engaging in physical fights as a result of substance use (Item 4; $r = .26, p < .001$), and having an accident while driving as an outcome of substance use (Item 6) and missing work due to substance use (Item 7; $r = .29, p < .001$). These findings indicated that these social problems were not associated with one another.

Table 5 displays the correlations between the AEQ items that concerned engagement in ARTBs (AB) and those that concerned substance-related behaviours (Sub). The correlations between the items ranged from low to

moderate and were in almost all cases statistically significant. Some of the associations between the items were stronger than others. For example, the relationship between avoiding paying for things (AB, Item 1) and consuming marijuana (Sub, Item 3; $r = .57, p < .001$), avoiding paying for things (AB, Item 1) and consuming hallucinogens (Sub, Item 4; $r = .57, p < .001$), being drunk in public (AB, Item 2) and consuming marijuana (Sub, Item 3; $r = .62, p < .001$), being drunk in public (AB, Item 2) and consuming hallucinogens (Sub, Item 4; $r = .62, p < .001$), shoplifting (AB, Item 13) and consuming hallucinogens (Sub, Item 4; $r = .60, p < .001$), and shoplifting (AB, Item 13) and consuming amphetamines (Sub, Item 6; $r = .61, p < .001$) were moderately associated. These relationships indicated that engagement in each of these behaviours was associated with engagement in the other. Therefore, it can be concluded that individuals who engage in ARTBs are also likely to engage in substance consumption. Several negative correlations were also found between attempting or having

Table 2. The correlations for the Antisocial Engagement Questionnaire: antisocial behaviour items.

Item	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1	1.00																					
2	.44**	1.00																				
3	.45**	.58**	1.00																			
4	.15**	.13**	.14**	1.00																		
5	.22**	.12*	.25**	.36**	1.00																	
6	.17**	.09*	.09*	.16**	.32**	1.00																
7	.26**	.26**	.33**	.22**	.24**	.26**	1.00															
8	.17**	.09*	.20**	.30**	.38**	.27**	.29**	1.00														
9	.25**	.13**	.23**	.34**	.34**	.23**	.18**	.33**	1.00													
10	.29**	.17**	.25**	.48**	.41**	.36**	.26**	.47**	.36**	1.00												
11	.31**	.30**	.33**	.12**	.22**	.23**	.10*	.25**	.34**	.36**	1.00											
12	.52**	.41**	.44**	.15**	.34**	.16**	.31**	.18**	.26**	.25**	.36**	1.00										
13	.56**	.42**	.42**	.24**	.28**	.22**	.27**	.25**	.26**	.42**	.36**	.48**	1.00									
14	.49**	.35**	.47**	.31**	.38**	.26**	.40**	.31**	.32**	.51**	.38**	.49**	.62**	1.00								
15	.17**	.12*	.17**	.38**	.38**	.27**	.22**	.42**	.33**	.33**	.11	.22**	.21**	.32**	1.00							
16	.07	.08*	.10*	.29**	.20**	.05	.12**	.39**	.04	.27**	.06	.12**	.14**	.18**	.43**	1.00						
17	.07	-.07	-.03	.01	.02	.03	.01	.13**	.22**	.05	-.01	.05	-.03	-.03	-.04**	.04	1.00					
18	.23**	.14*	.26**	.34**	.30**	.18**	.19**	.32**	.26**	.30**	.16**	.23**	.30**	.31**	.36**	.16**	.06	1.00				
19	.14**	.09*	.18**	.34**	.23**	.17*	.09*	.32**	.28**	.34**	.10	.13**	.24**	.20**	.31**	.13**	.20**	.63**	1.00			
20	.15**	.09	.14**	.57**	.47**	.23**	.19**	.30**	.31**	.30**	.16**	.16**	.19**	.28**	.57**	.28**	.01	.32**	.26**	1.00		
21	.31**	.23**	.35**	.30**	.46**	.28**	.31**	.29**	.24**	.39**	.27**	.42**	.35**	.43**	.47**	.19**	.04	.36**	.35**	.35**	1.00	
22	.55**	.44**	.50**	.18**	.30**	.17**	.25**	.16**	.20**	.28**	.32**	.49**	.50**	.50**	.21**	.13**	-.04	.25**	.17**	.20**	.35**	1.00

Note. Please refer to Table 1 item key for the Antisocial Engagement Questionnaire for item descriptions.

* $p < .05$. ** $p < .001$.

Table 3. The correlations for the Antisocial Engagement Questionnaire: substance-related items.

Item	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	1.00														
2	.56**	1.00													
3	.61**	.76**	1.00												
4	.44**	.59**	.72**	1.00											
5	.30**	.47**	.46**	.60**	1.00										
6	.47**	.64**	.70**	.83**	.65**	1.00									
7	.30**	.44**	.43**	.49**	.78**	.55**	1.00								
8	.11*	.19**	.19**	.27**	.40**	.28**	.40**	1.00							
9	.13**	.23**	.25**	.30**	.45**	.36**	.42**	.37**	1.00						
10	.25**	.38**	.41**	.56**	.55**	.62**	.49**	.31**	.40**	1.00					
11	.33**	.44**	.48**	.61**	.52**	.63**	.43**	.18**	.29**	.37**	1.00				
12	.24**	.37**	.37**	.50**	.63**	.63**	.57**	.41**	.61**	.57**	.45**	1.00			
13	.34**	.44**	.48**	.63**	.62**	.63**	.57**	.31**	.41**	.54**	.55**	.59**	1.00		
14	.28**	.35**	.39**	.38**	.58**	.40**	.65**	.36**	.28**	.39**	.36**	.44**	.52**	1.00	
15	.09	.16**	.15**	.22**	.32**	.25**	.31**	.67**	.28**	.24**	.18**	.33**	.26**	.30**	1.00

Note. Please refer to Table 1 item key for the Antisocial Engagement Questionnaire for item descriptions.

* $p < .05$. ** $p < .001$.

Table 4. The correlations for the Antisocial Engagement Questionnaire: social problem items.

Item	1	2	3	4	5	6	7	8
1	1.00							
2	.65**	1.00						
3	.45**	.50**	1.00					
4	.26**	.32**	.47**	1.00				
5	.43**	.38**	.64**	.38**	1.00			
6	.23**	.30**	.33**	.51**	.32**	1.00		
7	.49**	.44**	.48**	.30**	.51**	.29**	1.00	
8	.47**	.40**	.47**	.53**	.38**	.47**	.39**	1.00

Note. Please refer to Table 1 item key for the Antisocial Engagement Questionnaire for item descriptions.

* $p < .05$. ** $p < .001$.

sexual relations with someone against their will (AB, Item 17) and the consumption of substances such as alcohol to excess (Sub, Item 1; $r = -.12$, $p < .05$), tobacco (Sub, Item 2; $r = -.04$, $p > .05$), marijuana (Sub, Item 3; $r = -.02$, $p > .05$), cocaine (Sub, Item 11; $r = -.02$, $p > .05$), methamphetamines (Sub, Item 12; $r = -.02$, $p > .05$), and consuming medication prescribed by a doctor more often or in greater amounts than prescribed (Sub, Item 14; $r = -.02$, $p > .05$), suggesting that engagement in sexual relations against someone's will (Item 17) was not predictive of engagement in a range of substance-related behaviours.

Discussion

An investigation into the relationship among the behaviours described in the AEQ supported the first research aim as statistically significant associations were found between the majority of the items, indicating that engagement in one item was associated with engagement in other items. Some of the items demonstrated stronger correlations than others. For example, strong correlations were found between ARTBs, such as being disorderly in public and committing minor infringements, using force or strong-arm methods to obtain a desired item from someone and attempting or stealing a motor vehicle, shoplifting and

Table 5. The correlations for the Antisocial Engagement Questionnaire: antisocial behaviour items and substance-related items.

Item	Substance-related behaviours														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	.36**	.48**	.57**	.57**	.44**	.53**	.38**	.23**	.24**	.38**	.41**	.36**	.41**	.30**	.16**
2	.86**	.53**	.62**	.62**	.30**	.48**	.26**	.13*	.13**	.31**	.31**	.26**	.35**	.24**	.09
3	.49**	.36**	.45**	.45**	.36**	.44**	.29**	.18**	.19**	.33**	.25**	.26**	.35**	.26**	.11*
4	.11*	.17**	.17**	.22**	.22**	.15**	.27**	.40**	.23**	.18**	.08	.30**	.23**	.32**	.26**
5	.12*	.16**	.23**	.22**	.22**	.20**	.23**	.25**	.15**	.18**	.19**	.27**	.25**	.27**	.18**
6	.08	.13**	.15**	.20**	.19**	.16**	.19**	.17**	.15**	.16**	.17**	.14**	.25**	.23**	.14**
7	.20**	.25**	.28**	.31**	.23**	.24**	.22**	.11*	.17**	.20**	.23**	.16**	.25**	.13**	.08
8	.09	.13**	.15**	.16**	.20**	.17**	.20**	.21**	.26**	.14**	.19**	.27**	.25**	.23**	.19**
9	.11*	.18**	.19**	.27**	.26**	.27**	.22**	.28**	.22**	.23**	.24**	.25**	.30**	.25**	.25**
10	.16**	.20**	.20**	.28**	.35**	.28**	.35**	.35**	.30**	.26**	.24**	.36**	.37**	.35**	.38**
11	.25**	.31**	.35**	.32**	.26**	.38**	.27**	.29**	.15**	.37**	.23**	.27**	.27**	.28**	.24**
12	.36**	.52**	.53**	.51**	.41**	.51**	.38**	.18**	.26**	.38**	.41**	.40**	.43**	.37**	.12*
13	.36**	.46**	.51**	.60**	.49**	.61**	.42**	.22**	.31**	.40**	.46**	.46**	.53**	.31**	.18**
14	.33**	.40**	.46**	.53**	.44**	.52**	.43**	.21**	.21**	.35**	.42**	.42**	.49**	.38**	.15**
15	.07	.11*	.12*	.23**	.27**	.22**	.25**	.28**	.37**	.21**	.18**	.18**	.28**	.25**	.12*
16	.08	.11*	.07	.14**	.19**	.16**	.19**	.10	.24**	.09	.16**	.16**	.16**	.18**	-.02
17	-.12*	-.04	-.02	.01	.00	-.04	-.04	.05	.04	.05	-.02	-.02	-.04	-.02	.07
18	.16**	.16**	.21**	.27**	.31**	.27**	.24**	.21**	.24**	.21**	.26**	.33**	.33**	.26**	.18**
19	.09	.09	.09	.13**	.22**	.15**	.19**	.31**	.21**	.11*	.17**	.24**	.25**	.25**	.30**
20	.04	.13*	.16**	.24**	.24**	.21**	.22**	.42**	.21**	.19**	.10*	.29**	.25**	.25**	.23**
21	.21**	.27**	.26**	.32**	.39**	.31**	.44**	.37**	.29**	.31**	.25**	.36**	.36**	.37**	.17**
22	.39**	.43**	.51**	.44**	.42**	.44**	.40**	.23**	.13*	.29**	.35**	.29**	.40**	.34**	.16**

Note. Please refer to Table 1 item key for the Antisocial Engagement Questionnaire for item descriptions.
 * $p < .05$. ** $p < .001$.

Figure 1. Example correlations between the Antisocial Engagement Questionnaire antisocial behaviour items. ** $p < .001$. Included correlations were $r \leq .50$. A colour version of the figure can be found online at www.tandfonline.com/tpp1

Figure 2. Example correlations between the Antisocial Engagement Questionnaire substance-related items. ** $p < .001$. Included correlations were $r \leq .60$. A colour version of the figure can be found online at www.tandfonline.com/tpp1

Figure 3. Example correlations between the Antisocial Engagement Questionnaire items. ** $p < .001$; Included correlations were $r \leq .50$. A colour version of the figure can be found online at www.tandfonline.com/tppl

engagement in acts of vandalism, and shoplifting and committing minor infringements. Furthermore, strong correlations were also found between engagement in antisocial acts and substance-related behaviours. For example, a strong correlation was found between avoiding paying for things (such as, movies or public transport) and the consumption of marijuana, avoiding paying for things and the consumption of hallucinogens, being drunk in public and consuming marijuana, being drunk in public and consuming hallucinogens, shoplifting and consuming hallucinogens, and shoplifting and consuming amphetamines. Documenting these relationships was important as the associations between the majority of the behaviours had not been investigated as previous research has focused on the associations between a narrow selection of behaviours. Exploring these associations was required for documenting predictors – for example, documenting the relationship between threatening to hit an individual of authority and physically hitting a person of authority identified threatening physical

violence as a predictor of physical violence (Barnes et al., 2001) and extends our knowledge regarding the relationship between these acts (Barnes, Gordon, & Hudson, 2001).

The results also support the findings of previous research. For example, the act of school truancy was correlated with the consumption of substances such as tobacco, marijuana and hallucinogens (Dembo et al., 2013; Vaughn et al., 2013). Similarly, the results support previous research that found that substance use and antisocial acts such as vandalism, carrying a weapon, theft, disorderly behaviour and physical violence have a tendency to co-occur (Crane, Pilver, & Weinberger, 2014; Horner et al., 2012; Lier et al., 2009). The associations found between the behaviours of interest also support Gatti et al.'s (2013) theory that engagement in ARTBs and substance use are bi-directional, as a strong association between engagement in antisocial behaviours and the consumption of substances was found. Additional research should explore whether the consumption of substances is a by-product of the antisocial

lifestyle or whether antisocial behaviour and substance use are associated in a bidirectional manner. Qualitative research should also explore the experiences of individuals who have engaged in antisocial trajectories to investigate whether the psychopharmacological elements of substance use exacerbate engagement in antisocial behaviours.

The second research question attempted to ascertain whether the consumption of one substance would increase the likelihood that an individual would consume other substances. As statistically significant correlations were found between the substance-related items, this suggested that the consumption of one substance increased an individual's propensity to consume other substances. The results support the findings of previous research (e.g., Scholes-Balog, Hemphill, Reid et al., 2013; Torabi et al., 2010; Weitman et al., 1972; Zhao & Harris, 2004), in addition to extending our knowledge regarding the associations between a large selection of substances that had not previously been investigated. These associations are useful for understanding the mechanisms that underpin poly-substance usage because it was found that there were no clear groupings of associations between the substances, implying that individuals who use substances are likely to consume a range of substances and that these individuals will not be particularly selective in the types of substances they consume.

Implications of the study

As understanding the behaviour of individuals who engage in ARTBs is necessary for understanding the development of antisocial careers (Huizinga, Esbensen, & Weiher, 1991; Ramchand, MacDonald, Haviland, & Morral, 2009; Thornberry & Krohn, 2000), the findings of this research have a range of implications. This exploration into the associations between 45 ARTBs has resulted in extending our understanding of engagement in ARTBs and antisocial lifestyles as many of the associations were yet to be investigated. These

findings build on research relating to behaviour prediction (Dembo et al., 2013) and are important to assist clinicians with understanding and working with at-risk individuals. The results of this research also have specific implications for understanding poly-substance use as we now have a detailed understanding of which substances tend to co-occur. The findings confirm previous research regarding the issue of poly-substance use (Australian Institute of Health and Wellbeing, 2014; White et al., 2013), in addition to extending our knowledge regarding the associations between 15 substance-related behaviours.

In addition to extending the research literature, the findings of this study have implications for the development of interventions that are designed to minimise engagement in ARTBs. The documentation of the associations between the behaviours of interest should be used to inform the development of interventions so that they may address the issue of co-occurring ARTBs. It is important to address engagement in multiple ARTBs through intervention, as it is evident from the present findings that individuals tend to engage in multiple ARTBs during their involvement in antisocial trajectories. Therefore, documenting the associations between the behaviours of interest has implications for the development of targeted intervention programmes as well as psycho-educational programmes.

Limitations of this research and future directions

Several limitations must be acknowledged when reviewing the findings of this study. First, this research utilised self-report methods to investigate engagement in ARTBs without consideration of other methods, such as official recordings of engagement. Relying solely on self-report methods is problematic as this relies on how adequately the sample understood what was required, the participant's honesty and the respondent's memory recall abilities, resulting in possible biases and distortions (Mak, 1993; Watt, Geritz, Hasan,

Harden, & Doley, 2015). Although the self-report method is associated with several limitations, there is evidence in the research literature that supports the reliability of the self-report format in this context (for example, Farrington, 1973; Monahan, Steinberg, Cauffman, & Mulvey, 2009; Palmer & Hollin, 2001). It should be noted that while it is possible that some self-report bias is reflected in the data, the present research attempted to reduce the impact of potential bias. Although self-report measures have been found to have advantages over official records and have been found to be an accurate method for measuring engagement in ARTBs, the involvement of multiple approaches to exploring ARTBs is preferable.

A further limitation of this research is that a sample of convenience was used, which consequently limits the results, as they cannot be generalised to more specific populations. Future research should aim to replicate this research using specified populations. Furthermore, this study only explored the associations between a selection of ARTBs. Therefore, it is important that future research investigates the associations between additional behaviours of interest. It is important that the findings of this study are viewed in light of these limitations and that these weaknesses are considered in future research. Despite these limitations, it is anticipated that this research will extend our understanding of engagement in ARTBs

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Ethical standards

Declaration of conflicts of interest.

Kimberley A. Brindle has declared no conflicts of interest.

Terence V. Bowles has declared no conflicts of interest.

Elizabeth Freeman has declared no conflicts of interest.

Ethical approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee (add as appropriate) and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent

Informed consent was obtained from all individual participants included in the study

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