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Under Pressure: Examining Adolescent Resistance to Antisocial Peer Pressure Using Virtual Reality

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UNDER PRESSURE: EXAMINING ADOLESCENT RESISTANCE TO

ANTISOCIAL PEER PRESSURE

USING VIRTUAL REALITY

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UNDER PRESSURE: EXAMINING ADOLESCENT RESISTANCE TO ANTISOCIAL PEER PRESSURE USING VIRTUAL REALITY

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Under Pressure: Examining Adolescent Resistance to Antisocial Peer Pressure Using Virtual Reality

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How adolescents resist antisocial peer pressure is an important determinant of problem behaviors, yet little is known about how resistance elements—what teens say (tactics) and how they say it (assertiveness)—operate together and relate jointly to problem behaviors. **Objective:** We examined how assertiveness and tactics relate to problem behaviors in different situations by extending previous research using an innovative virtual reality (VR) paradigm. We hypothesized 1) modest associations between assertiveness and tactics, 2) modest associations between tactics and problem behaviors, and that 3) assertiveness and tactics would independently contribute to problem behaviors after accounting for one another. **Method:** Late adolescents (n = 264; M_{age} = 18.17, 46% male) recruited from first-year undergraduate classes reported their antisocial behavior and dating violence perpetration over the past two months. Participants engaged in four peer pressure VR simulations (theft, academic dishonesty, sexual assault, and substance use). VR simulation responses previously coded for assertiveness (Sargent et al., 2020) were newly coded for tactics in the present research. Prior to testing hypotheses, exploratory factor analyses were conducted to examine the extent to which responses operated in situation-specific and trait-like fashions. **Results:** Factor analyses resulted in removal of one simulation and highlighted

situation-specific variance. Accordingly, hypotheses were tested by simulation rather than summed across VR scenes. Tactics and assertiveness were associated (r = .49 to .70) within each simulation (hypothesis 1), and assertiveness and tactics were inconsistently related to problem behavior (r = -.02 to -.38) (hypothesis 2). When assertiveness and tactics were examined simultaneously, only assertiveness uniquely contributed to problem behaviors. Interactive effects with gender emerged in only one simulation focused on marijuana use; among females who exhibited high levels of assertiveness, tactics was related to less dating violence perpetration. Exploratory analyses helped clarify the nature of responses from participants with patterns of nonresistance. **Conclusion:** Adolescents' responses to antisocial peer pressure appear influenced by situation-specific variance, such that the tactics used, the degree of assertiveness, and the relation between these components vary based on the situation. Future research should continue to refine how situational factors influence how adolescents resist antisocial peer pressure.

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Introduction

Adolescence is marked by substantial neurodevelopmental change as well as increases in delinquent behaviors, sensation-seeking, and risky decision-making (Romer et al., 2017). Indeed, over 700,000 juvenile arrests are made annually in the United States, spanning violent and nonviolent offenses, with many crime rates peaking in late adolescence around age 19 (Office of Juvenile Justice and Delinquency Prevention, 2019). Additionally, adolescent dating violence affects approximately 20% of teens (Wincentak et al., 2017), and 1 in 4 high school seniors report illicit substance use in the past month (National Institute on Drug Abuse, 2018). Risky behaviors such as these are broadly referred to as adolescent problem behaviors, or APB (Jessor & Jessor, 1977; Ary, Duncan et al., 1999).

Peer links to adolescent problem behaviors

The social learning theory of delinquency (Akers & Jensen, 2006; Bandura, 1977; Patterson, 1982) argues that APB may emerge through peer modeling and reinforcement of risky behaviors. Empirical support for this theory can be found in Dishion's work on coercive talk among adolescent males (Dishion et al., 1996), as well as consistent links between deviant peer affiliation and one's own problem behaviors (Ary et al., 1999; Goldstein et al., 2005). Developmentally, social learning from peers (including antisocial learning) is theorized to be particularly influential during adolescence due to increasing autonomy from parents paired with a heightened desire for peer belonging (Newman et al., 2007; Parker et al., 2006). Indeed, risk behaviors appear to peak during middle-to-late adolescence (Farrington, 1986; Johnson et al., 2015). Meanwhile, empirical evidence indicates that resistance to peer influence increases linearly from ages 14 to 18 (Steinberg & Monahan, 2007). Thus, late adolescence may be a

critical time to leverage this intersection of heightened risk and effective, socially competent resistance to negative peer influence.

Accordingly, how late adolescents navigate relationships with antisocial peers is thought to contribute to their development of autonomy, self-identity, and social competence (Dumas et al., 2012; Erikson, 1968; Schad et al., 2008; Steinberg & Silverberg, 1986). Antisocial peer pressure is broadly defined as any peer attempt to compel or encourage an individual into risky or deviant behaviors (Ngee Sim & Fen Koh, 2003). Self-reported susceptibility to such pressure, or how much a teen perceives themselves as likely to "give in" to antisocial peer influence, is related to conduct problems across adolescence (Meldrum et al., 2012; Santor et al., 2001; Sargent et al., 2020). As such, peer pressure may be an important component in the link between antisocial peer affiliation and APB.

Teaching teens to resist antisocial peer pressure

To address this, many clinical interventions include instruction on resisting antisocial peer pressure (Marsiglia et al., 2015; McArthur et al., 2015; Rowe et al., 2015; Tuttle et al., 2006; Wolfe et al., 2012), albeit some with mixed success (*G.R.E.A.T.*, Esbensen et al., 2011; *D.A.R.E.*, West & O'Neal, 2004). Competence enhancement interventions, in which social competence is promoted using modeling, rehearsing, and coaching of new skills, show some effectiveness at reducing APB (Wilson et al., 2001). These interventions often teach specific resistance tactics, such as simple refusal, explaining one's position, avoiding risky situations, and leaving when necessary (e.g., *Keepin' it REAL*, Kulis et al., 2008). Others tout assertiveness, characterized by confident, unwavering refusals (e.g., *My Voice My Choice*; Rowe et al., 2015). To date, however, it remains unclear the extent to which tactics (what you say) and assertiveness (how you say it) function together in connection with APB.

Measuring resistance tactics: What you say

A growing body of research suggests that how frequently adolescents use specific tactics in response to antisocial peer pressure relates to APB. For example, in a sample of high-school students, frequency of using tactics of negotiation and refusal negatively related to substance use (r = -.22 to -.34) (Wolfe et al., 2012). Similarly, Kulis and colleagues (2008) examined self-reports of specific tactics in response to actual substance use pressures and related these scores to retrospective self-reports of substance use. Adolescents reported on the frequency of each strategy (refuse, explain, avoid, leave) in the last 30 days to resist offers of alcohol, cigarettes, and marijuana, respectively. Greater tactics use related to lower lifetime alcohol use (r = -0.23), recent alcohol use (r = -0.19), binge drinking (r = -0.21), lifetime cigarette use (r = -0.34), and recent cigarette use (r = -0.35) (Kulis et al., 2008).

However, existing studies largely focus on how frequently teens use *specific* tactics, which may fail to capture the social benefits of flexibly using a variety (i.e., repertoire) of tactics. This is a particularly important given consistent findings that use of certain tactics differs based on the pressuring act and context. In one study, coded resistance responses of refuse, explain, avoid, leave, inform authorities, or act aggressively significantly varied by specific sexual pressure situations in a sample of Latina early adolescents (Norris, et al., 2015). Among urban minority adolescents, teens engaged in more simple refusal (i.e., just saying no) when resisting peer pressure to smoke and greater use of suggesting alternatives when resisting pressure to shoplift in two separate role-plays (Nichols et al., 2006). Drug refusal strategies similarly differed based on the substance being offered among Mexican adolescents (Kulis et al., 2008). Thus, a range of tactics may be needed because pressure may change over time, or vary by situation, relationship, or antisocial act (Kulis et al., 2013). In short, if different pressures

necessitate different tactics, effective resistance may call for a broad repertoire of tactics that adolescents can implement flexibly.

In this sense, common prevention messages (i.e., "Just say no") may be akin to providing teens only a hammer, assuming that every peer coercion situation will present the problem of a nail. Realistically, adolescents may require a toolbox of responses to draw from when responding to different peers, resisting different acts, and considering different legal or relational consequences. Only one study to our knowledge has formally acknowledged the notion of a repertoire in its conceptualization of tactics, hypothesizing that limited prosocial tactics (i.e., simple refusal, walking away) may be less protective against APB than employing a variety of resistance strategies (Wright et al., 2004). Specifically, Wright and colleagues (2004) investigated middle school adolescents' use of tactics in response to role-played pressure to engage in smoking or theft. Variety scores were generated by summing the number of unique refusal responses used in a given pressure situation (e.g., if a simple no was used first, any subsequent response except a simple no was coded as a new, divergent response). Results indicated that use of prosocial-only (e.g., simple refusal, offering an alternative) tactics was less consistently predictive of APB than tactics variety scores. Use of assorted resistance tactics in role-plays was linked to favorable changes in acts of theft and vandalism approximately one year later, whereas exclusive use of prosocial-only responses actually predicted *increases* in aggressive behaviors over time (Wright, et al., 2004). Thus, the limited socially appropriate approaches pushed by prevention programs may be less helpful than a repertoire of skills, even if said repertoire includes intuitively "ineffective" techniques (e.g., making excuses).

Examining teens' (non)use of a variety of tactics can inform clinical intervention, such that interventions focusing on using one or two tactics may fail to fully mitigate adolescents'

susceptibility to antisocial peer influence. Moreover, we need to not only understand the scope of teens' available tactics (i.e., the size of their toolbox), but their ability to actually implement the breadth of one's repertoire when needed. Resisting antisocial peer pressure may require not only a broad skillset of tactics, but social awareness to recognize when a tactic fails to work effectively, prompting a tactics switch (i.e., flexibly using one's repertoire). Understanding these elements can inform interventions on how best to allocate time on expanding tactics repertoires or emphasizing how to flexibly apply them.

Measuring resistance assertiveness: How you say it

Common advice preaches, "It's not what you say but how you say it," that matters most in communication (Knaus, 2013). In line with this adage, observational ratings of assertiveness coded from peer pressure role-plays have operationalized this construct as using a firm, authoritative voice, making direct eye contact while maintaining a confident facial expression, and using language that clearly and deliberately communicates one's message (Nichols et al., 2006). Previous research indicates that resistance assertiveness related to self-reports of antisocial behaviors and dating violence perpetration in a sample of late adolescents (r = -.15 to -.34) (Sargent et al., 2020). Similar to research on resistance tactics, assertiveness may also vary based on the situation at hand; one study found that youths' socially assertive and aggressive responses to peer provocation often matched elements of the provocation situation itself (i.e., verbal versus physical antagonism) (Dirks et al., 2014).

Virtual reality

Notably, however, existing measurement of resistance to antisocial peer pressure may fail to fully capture how teens interact with peers (Sargent et al., 2020). In response, Sargent and colleagues introduced an innovative observational procedure using virtual reality (VR) to better

assess teens' responses to antisocial peer pressure. VR assessment methods take advantage of observational techniques to code behavioral responses within realistic, immersive virtual environments. VR also offers the ability to standardize the social stimuli participants experience, such as the specific peer coercion tactics used, the social status of the pressuring peer, and the frequency and persistence of pressuring statements. This mitigates many issues related to differences in peer pressure exposure and opportunity to engage in risk behaviors across different situations.

An initial validation study of this VR paradigm presented adolescents with four simulations in which an avatar "friend" pressured participants to jointly engage in a variety of antisocial behaviors. Audiotapes of teens' verbal responses were rated on resistance assertiveness using a four-point (0 = *Non-resistant* to 3 = *Very resistant*) scale. Ratings were then summed across the four VR simulations to create a total resistance assertiveness score, which demonstrated evidence of criterion, convergent, and discriminant validity in a sample or first-year college students (Sargent et al., 2020). Specifically, total resistance assertiveness scores were negatively associated with dating violence perpetration (r = -.15) and a brief, broad self-report of antisocial behaviors (r = -.34). Total scores also documented a small negative (r = -.21) association between the VR scores and self-reports of susceptibility to peer pressure. As evidence of discriminant validity, the pattern of correlations among individual VR simulation ratings meaningfully differed from relations to social response ratings in similar VR simulations with different content (bystander behavior). This VR measure also demonstrated an average inter-item correlation of r = .42 (each of the four simulations conceptualized as an item), and a coefficient alpha of .74. Additionally, participants rated each VR scene as moderately immersive

and realistic. In short, VR offers a compelling paradigm for comprehensive behavioral assessment of adolescent resistance to antisocial peer pressure.

Addressing gaps in the literature

Existing research suggests that both what adolescents say to resist (tactics) and how they say it (assertiveness) meaningfully relate to APB. To date, however, these components remain largely unintegrated in the literature, limiting understanding of how each contributes to APB when studied together. Realistically, tactics and assertiveness are unlikely to operate in isolation, and may function additively to mitigate susceptibility to antisocial peer pressure. Additionally, if tactics and assertiveness are each only modestly independently associated with APB, variability in these separate associations may be due to their dependent functioning. For example, high levels of both assertiveness and variety of tactics may potentiate the effects of the other, such that adolescents equipped with highly varied tactics and highly assertive responses are buffered against APB to a greater extent than high assertiveness or highly varied tactics could provide independently.

Clinically, interventions could benefit from understanding how each component functions independently and together to contribute to APB. For example, if these components are redundantly related to APB (assertiveness drives the tactic to APB link, or vice versa), interventions may benefit from focus on the stronger contributor. On the other hand, if both components emerge as unique, or interactive, contributors to APB, prevention efforts should consider specific instruction on assertive delivery across a flexible repertoire of tactics.

To our knowledge, only one study has measured both assertiveness and tactics in the same observational assessment, documenting modest positive associations between assertiveness and dichotomously scored use (used/did not use) of specific tactics (r = .14 to .23). Additionally,

a negative association (r = -.15) emerged between simple refusals (i.e., just saying no) and confident assertiveness in a shoplifting role-play (Nichols et al., 2006). Notably, however, this study did not link tactics use nor assertiveness to measures of APB, thus it remains unclear how these components effectively relate to such behaviors in real-life. Furthermore, this study and the bulk of previous studies (see e.g., Wolfe et al., 2012) employed only two peer pressure situations, such that findings could be bolstered by replication using additional scenarios to engage in other antisocial acts.

One limitation noted in Sargent et al. (2020) acknowledged that low assertiveness scores may occur for several reasons, such that it remains unclear whether unassertive adolescents are vulnerable to antisocial peer pressure due to lack of confidence, lack of risk awareness, lack of skills, or simply an affinity for antisocial behavior. This distinction is relevant both clinically and methodologically. Clinically, a homogenous unassertive group (i.e., all with a high affinity or enthusiasm for antisocial activities) may benefit from similar intervention approaches, whereas a group varied in its needs may require tailored approaches that address each resistance deficit uniquely. Methodologically, it is critical to understand if our assessment tool is indeed measuring what we intend to measure (resistance to antisocial peer pressure), and/or if it acts as a proxy for assessing another construct (e.g., affinity for antisocial behaviors). In efforts to address these concerns, the current study aims to provide more nuanced understanding of this phenomenon by further examining the relation of tactics (i.e., skills) and assertiveness (i.e., confidence) as separate components within adolescent resistance. Additionally, we build upon the work of Sargent et al. (2020) by exploring if results are driven by teens exhibiting low resistance, as well as qualitatively reviewing low resistance responses for affinity for antisocial behaviors.

Lastly, although a bulk of research has examined antisocial peer influence in early- and mid-adolescents, the late teenage years are nevertheless an important developmental stage for developing personal identity within social relationships (Erickson, 1968; Arnett, 2005), and navigating a context of continued neurodevelopmental maturation, salient peer influence, and heightened risk behaviors (Romer et al., 2017). Thus, it is important to observe how responses to antisocial peer pressure operate in relation to APB during this unique stage of growth.

The current study

In the current study, previously published observational data from four VR simulations used in Sargent et al. (2020) will be recoded for tactics. Given findings that assertiveness and tactics seems to differ based on the pressuring act and context (Dirks et al., 2014; Kulis et al., 2008; Nichols et al., 2006; Norris, et al., 2015), we examine the factor structure of both assertiveness and tactics observational ratings prior to testing hypotheses. Doing so helps clarify the extent to which adolescent responses operate in a situation-based and trait-like manner and allow for more appropriate analytic treatment of our observational variables. Should factor analysis results highlight situation-based variance, we will examine assertiveness and tactics as correlates of APB in separate simulations. Alternatively, if the results suggest these constructs function as trait-like responses, we will examine assertiveness and tactics by summing scores across simulations.

We will then examine how assertiveness scores relate to tactics scores, and how assertiveness and tactics operate together to predict APB in a sample of late adolescents. We hypothesize that observed assertiveness and tactics in the VR antisocial peer pressure simulations will 1) be modestly associated with each other ($r \sim .10$ to .30), and 2) tactics will be modestly associated with concurrent measures of APB, as measured by self-reports of general antisocial

behaviors and dating violence perpetration (r ~ -.15 to -.35). Assertiveness was concurrently associated with general antisocial behaviors (r = -.34) and dating violence perpetration (r = -.15) in the original Sargent et al. (2020) study. We also expect that 3) assertiveness and tactics will independently contribute to APB after accounting for one another.

Due to limited empirical literature considering tactics and assertiveness simultaneously, a directional hypothesis on the nature of their interactive functioning seems premature. Thus, we include an exploratory analysis to examine how assertiveness and tactics may interact in relations to APB. Additionally, given mixed findings regarding gender in associations between assertiveness and APB as reported in Sargent et al. (2020), we also consider simulation differences by gender. Finally, we provide exploratory analyses to determine the influence of nonresistant participants (i.e., presenting with low assertiveness and no use of resistance tactics) on hypothesized results, and supplement these findings with qualitative analysis of nonresistant participants' responses.

Method

Participants

Participants (*n* = 264) were recruited from first year required Wellness courses at a mid-size four-year university in the southwest United States. Students were offered course credit for participating, and those who chose not to participate were offered alternative assignments. The mean age of the sample (46% male) was 18.17 years (*SD* = 0.56), and was predominantly White (*n* = 215, 81%). However, Asian (*n* = 19, 7%), Black or African American (*n* = 9, 3%), and students who identified as "More than one race," (*n* = 15, 6%) or "Unknown" (*n* = 7, 3%) also participated. In a separate question about ethnicity, 33 students (13%) identified as Hispanic or Latino/a.

Procedures

The data for the present study were collected as part of a larger randomized controlled trial evaluating the effectiveness of a bystander intervention program. Students visited the research lab for a baseline assessment to complete self-reports and VR simulations. Only baseline data were utilized in the present study.

Measures

Antisocial Behaviors

Students completed the 9-item Honest Conduct Scale (HCS; Hamby et al., 2013), indicating whether they had engaged in a variety of delinquent behaviors (0 = *No*, 1 = *Yes*) over the past 2 months. Sample items include: "Have you ever hit, slapped or pushed other people or gotten into a physical fight with them?" "Have you ever written things or spray painted on walls or sidewalks or cars, where you were not supposed to do that?" As done in past research (Monahan et al., 2009; Sargent et al., 2016), a variety score was created by summing responses,

with higher scores indicating greater variety of antisocial behaviors. Coefficient alpha in the current sample was .55. at baseline assessment. Scores on this measure have been negatively associated with honesty and broad-spectrum mental health indices (Hamby et al., 2013). See Appendix A for full measure.

Dating Violence Perpetration

Students completed the 25-item perpetration subscale of the Conflict in Adolescent Dating Relationships Inventory – Revised (CADRI; Wolfe et al., 2001), reporting the frequency of dating violence perpetration to a romantic partner over the past 2 months. Behaviors were reported on a scale from 0 (*Never*) to 4 (*Four or more times*). Sample items included "I pushed, shoved, or shook them" and "I tried to turn their friends against them." Scores on each item were summed to derive a total score with higher scores indicating greater frequency of perpetration in the last 2 months. Internal consistency was $\alpha = .85$ at baseline assessment. For descriptive purposes, scores were also totaled by CADRI subscale, including physical abuse, sexual abuse, relational abuse, emotional abuse, and threatening behaviors. Prior research indicates that perpetration scores on the CADRI correlate with theorized risk factors for dating violence perpetration, such as hostility (Wolfe et al., 2003). See Appendix B for full measure.

Observed Responses to Antisocial Peer Pressure in VR Simulations

VR simulations were administered using a custom VR application and Oculus Rift goggles, through which students experienced themselves as seated in the passenger seat of a parked car with a peer avatar in the driver's seat. During the simulations, a trained actor controlled the avatar's speech and movements in real time via computer. Participants were instructed to "just be yourself," and to interact with the avatar as they normally would with a friend. VR simulations used in the present study included the same scenes used in Sargent et al.

(2020), including pressure to participate in academic dishonesty (*Cheat Sheet*), help facilitate a sexual assault (*Drunk Decisions*), use substances at a party in an abandoned house (*The Pre-Game*), and steal money from a peer (*Petty Theft*). See Appendix C for simulation scripts and descriptive information on actor adherence to scripted statements.

Each simulation was approximately two minutes long, in order to allow time for a sense of immersion in the virtual environment without unduly burdening participants with a lengthy assessment. In the simulations, actors conversed with participants using 5 to 6 scripted statements per simulation. Avatars were matched to the gender of the participant for all peer pressure scenarios except *Drunk Decisions*, in which a male avatar was used for all participants due to script content. At least two of the scripted statements in each peer pressure simulation directly pressured the participant to engage in or facilitate antisocial behaviors.

Observed VR Resistance Assertiveness. Simulations were audio recorded and previously coded for participant degree of resistance to negative peer pressure, as published in Sargent et al., (2020). Codes were made for each simulation on a 4-point scale (0 = *Non-resistant* to 3 = *Very resistant*). Ratings considered the content (resistance or submission), frequency, and assertiveness (reluctance or confidence) of participants' statements. For instance, participants who expressed agreement, encouragement, or provided no contest to engaging in the specified antisocial behaviors received a score of 0. Participants who responded hesitantly when making resistant statements, as evidenced by infrequent, inconsistent, noncommittal or vague resistant statements, or participants whose responses fluctuated between resistant and agreeable statements, received a score of 1. Participants who responded with consistently resistant statements with moderate confidence received a score of 2, and those that consistently,

assertively expressed resistance with clarity and confident explanation received a score of 3. See Appendix D for full coding instructions.

Simulations were coded by a primary coder who coded 100% of the simulations and a reliability checker who coded over 35% of them. Intraclass correlation coefficients (ICC) ranged from .90 to .92 at baseline in the full sample, and .90 to .93 at 2-month follow-up in the control group. As presented in Sargent et al. (2020), this code demonstrated appropriate internal consistency (coefficient alpha = .74 at baseline), and 2-month test-retest reliability (r = .62) in the current sample.

Observed VR Resistance Tactics. Simulation audiotapes were also coded for specific tactics, using a similar method to Wright and colleagues (2004) to capture divergent, or unique, tactics use. A tactic was defined as any resistant response to the avatar's pressure to engage in a delinquent behavior, and tactics were coded without regard to the appropriateness or assertiveness of individual responses. Appendix D provides full coding instructions. For example, responses of "No, I don't want to," "Let's do something else instead," and "My parents would be mad if they found out" would be considered unique tactics tapping simple refusal, suggesting alternatives, and consideration of consequences. Unqualified agreement to engage in antisocial behaviors was not considered a resistance tactic. Audiotapes were coded by a primary coder that coded 100% of the simulations and a reliability checker who overlapped 35%. Primary coders did not overlap across assertiveness and tactics codes.

A tactics score was created by summing the variety scores of each simulation (hereafter referred to as tactics variety), to reflect one's use of repertoire in each of the simulations. Interrater reliability (n = 93) for tactics variety was ICC = .84, ranging from .76 to .87 across simulations. The average interitem correlation (AIC) for tactics variety was r = .30, within the

guidelines (r = .15 to .50) recommended by Clark and Watson (1995), and Cronbach's alpha = .63.

VR Data Quality Check

Following each VR simulation, students responded verbally to two questions assessing how immersed they were in the simulation ("How much did you feel as though you were actually in the situation?") and how realistically they behaved within the scene ("How much did you respond as you normally would in real life?"). Ratings were made on a 5-point scale (1 = *Not at all*, 5 = *Very Much*). As previously published, participants as a group found all four simulations to be moderately immersive and realistic on average (Sargent et al., 2020). Specifically, mean immersion scores by simulation were as follows: *Drunk Decisions M* = 3.42, *SD* = 0.80; *Cheat Sheet M* = 3.46, *SD* = 0.84; *The Pre-Game M* = 3.58, *SD* = 0.87, and *Petty Theft M* = 3.52, *SD* = 0.90. Similarly, mean realism ratings were as follows: *Drunk Decisions M* = 4.33, *SD* = 0.73; *Cheat Sheet M* = 4.29, *SD* = 0.79; *The Pre-Game M* = 4.34, *SD* = 0.78, and *Petty Theft M* = 4.51, *SD* = 0.67. As previously published (Sargent et al., 2020), immersion ratings did not differ by simulation, p = .29, whereas realism ratings did, $F(3, 1048) = 3.40$, p = .02, such that *Petty Theft* was rated as more realistic than all others (ps < .03).

Data were further examined for the possibility that participants who rated simulations as completely unrealistic and non-immersive, respectively, may have responded inauthentically during the VR observational procedure (i.e., did not take the task seriously or found it to be prohibitively unrealistic). No participants rated realism as "Not at all" in any simulation. However, seven participants rated their experience as completely non-immersive across all four simulations, and 12 additional students rated at least one simulation as "Not at all" immersive. By simulation, these students totaled 13 in *Drunk Decisions* (4 males, 9 females), 13 in *Cheat*

Sheet (2 males, 11 females), 11 in *The Pre-Game* (2 males, 9 females), and 8 in *Petty Theft* (1 male, 7 females). Thus, 19 participants' data (n = 45 simulations) were qualitatively reviewed for indications of off-task behaviors or confusion (e.g., excessive laughter or sarcasm, complete silence, or questions indicating misunderstanding of the task). One tape was deemed invalid based on qualitative review, during which a male participant complained about the length of VR assessment.

Additionally, independent sample t-tests were conducted to examine if tactics variety scores and assertiveness scores differed between groups by level of immersion (0 = *Not at all*, 1 = *Slightly or higher*) in each simulation, respectively. Neither tactics variety nor assertiveness differed between groups in *Drunk Decisions*, *Cheat Sheet*, or *Petty Theft* ps > .17. In *The Pre-Game*, assertiveness trended toward significance, $t(260) = 1.83$, $p = .07$, such that non-immersed participants were rated higher in assertiveness ($M = 1.73$, $SD = 0.91$) than those who rated themselves as slightly immersed or more ($M = 1.19$, $SD = 0.95$). Additionally, tactics variety scores significantly differed between non-immersed ($M = 2.09$, $SD = 0.70$) and immersed ($M = 1.57$, $SD = 1.12$) groups in *The Pre-Game*, $t(12.36) = 2.34$, $p = .04$. Thus, participants who rated their experience as "Not at all" immersive in at least one simulation (n = 19) were conservatively considered to have failed the data quality check and removed from analyses.

Results

Of the total sample (n = 264), 4 students had incomplete VR data due to technical difficulties with the VR Oculus Rift or audio recording equipment: 2 students did not complete any VR simulations, one student did not complete *Cheat Sheet*, and one student did not complete *Petty Theft*. Additionally, 19 participants that rated any VR scene as "Not at all" immersive (i.e., failed data quality check) were excluded from analyses. Thus, analyses proceeded with n = 241 students that provided complete and valid VR data.

APB in current sample

Means and standard deviations for self-reported antisocial behaviors and dating violence perpetration in the past two months are reported in Table 1. In the current sample (n = 241), 36.9% (n = 89) reported engaging in at least one antisocial act in the past 2 months. Of these 89 students, antisocial acts reported included: smoking marijuana or other recreational drug use (not including alcohol use) (70.8%, n = 63), academic cheating (23.6%, n = 21), theft (22.4%; n = 20), bullying or threatening behaviors (14.6%, n = 13), physical fighting with someone who is not a romantic partner (11.2%, n = 10), intentional property damage (5.6%, n = 5), and marking graffiti (3.3%, n = 3). No students reported getting arrested in the past 2 months. Males (M = 0.72, SD = 1.16) reported more antisocial behaviors than females (M = 0.45, SD = 0.77), $F(1, 240) = 4.64$, $p = .032$.

With respect to dating violence perpetration, 60.2% (n = 145) reported committing at least once act of violence against a romantic partner in the past 2 months. Of students reporting at least one violent act, 98.6% (n = 143) engaged in emotional verbal abuse, 13.8% (n = 20) perpetrated at least one act of sexual abuse, 13.1% (n = 19) engaged in relational abuse, 11.7% (n = 17) perpetrated at least one act of physical abuse, and 7.6% (n = 11) perpetrated threatening

behavior towards a romantic partner. Females (M = 6.31, SD = 8.34) reported more total dating violence perpetration than males (*M* = 4.06, *SD* = 6.03), *F*(1, 238) = 5.58, *p* = .019. When examining subtypes of abuse separately, females (*M* = 5.69, *SD* = 7.34) reported greater emotional verbal abuse perpetration than males (*M* = 3.63, *SD* = 5.42), *F*(1, 238) = 5.99, *p* = .015. No sex differences emerge for any other type of abuse, *p*s > .128.

Factor Analyses

Prior to conducting planned hypothesis tests, preliminary analyses were implemented to explore the factor structure of VR observational ratings and determine appropriate analytic treatment of independent variables.

Factor Structure of VR Observational Codes

Associations among the eight observational VR ratings (four tactics variety codes and four assertiveness codes) were examined using exploratory factor analyses. Principal axis factoring (PAF) was initially conducted to examine underlying latent variables, such that responses to VR stimuli represented more trait-like phenomena. ProMax rotation was used since we anticipated the resulting factors to be correlated, and the structure matrix was examined for each factor solution tested. Velicer's Minimum Average Partial (MAP) analyses indicated one factor suited these data. Extracting all factors with Eigen values greater than 1.0 indicated no more than two factors should be extracted. Parallel analysis using 1000 permutations of the raw data set, revealed a maximum of one factor should be extracted using a 95% confidence interval. However, based on past research that suggests adolescent responses may vary by simulation (Dirks et al., 2014; Nichols et al., 2006; Norris et al., 2015; Kulis et al., 2008), as well as our use of VR simulations that sampled four potentially distinct kinds of antisocial opportunity, we over-extracted up to four factors.

PAF did not converge in all four models tested due to communalities exceeding 1.0. Thus, principal components analyses (PCA) were substituted as a data reduction technique. Appendix E provides supplemental tables of PAF solutions derived from terminated extractions; models did not appear to substantially differ from PCA results. Pattern matrices for each factor solution tested are presented in tables 2 through 4.

Two-factor Solution. We first examined a two-factor solution (Table 2), since assertiveness and tactics variety codes were conceptualized as related, but distinct, components of adolescent responses to antisocial peer pressure. A two-factor solution explained 57.22% of the total variance. Although four items load onto each factor, three of which are unified by theorized scale (i.e., assertiveness or tactics, respectively), the strongest loadings for each factor are related by simulation, namely *Cheat Sheet* for factor 1, and *The Pre-Game* for factor 2. Furthermore, the assertiveness item on the predominantly tactics-based factor is not from the same simulation as the tactics item on the predominantly assertiveness-based factor. Thus, items do not appear to function as two distinct subscales.

Three-factor Solution. A three-factor solution explained 68.50% of the total variance. As shown in Table 3, factors appeared somewhat unified by simulation, such that factor 1 represented primarily items from *Cheat Sheet*, factor 2 from *The Pre-Game*, and factor 3 from *Petty Theft*. Items from *Drunk Decisions* loading separately onto factors 1 and 2. The assertiveness item from *Petty Theft* functioned as a "splitter" item between factors 1 and 3.

Four-factor Solution. A four-factor solution explained 78.27% of the total variance. As shown in Table 4, items loaded by simulation, with the exception of the *Petty Theft* assertiveness code, which again functioned as a "splitter" item across factors 1 and 4 (factor loadings = .480 and .479, respectively).

Reduced Three-factor (simulation-based) Solution. Given these results, both items derived from *Petty Theft* were dropped, and a three-factor solution was re-run with the six remaining items (see Table 5). Items appeared to load by simulation, such that factor 1 represented *The Pre-Game*, factor 2 represented *Cheat Sheet*, and factor 3 represented *Drunk Decisions*.

Hypothesis Tests

On the basis of these results, hypothesized and exploratory analyses proceeded at the simulation-level, examining results within *The Pre-Game*, *Cheat Sheet*, and *Drunk Decisions* simulations, respectively.

Bivariate associations among study variables (hypotheses 1 & 2)

Table 1 presents bivariate correlations. Regarding hypothesis 1, within simulation associations between tactics variety and assertiveness ranged from r = .49 to .70. Thus, correlations between tactics and assertiveness scores were moderate to high. Echoing factor analysis results, the strongest correlation in each column was most often between codes within the same simulation, rather than within the same coding system.

Given the range in the magnitude of correlations, we next tested if the magnitude of associations between assertiveness and tactics differed across simulations using Fisher r-to-z transformations. Associations did not differ between *Cheat Sheet* (r = .59) and *Drunk Decisions* (r = .49), z = 1.54, p = .12. However, tactics variety and assertiveness were more strongly correlated in *The Pre-Game* (r = .70) than in *Cheat Sheet*, z = 2.07, p = .04, as well as *Drunk Decisions*, z = 3.61, $p < .001$.

Regarding hypothesis 2, antisocial behaviors was modestly (r = -.15) to moderately (r = -.36) related to tactics variety in *The Pre-Game and Cheat Sheet* simulations, but not the *Drunk*

Decisions simulation. Associations between tactics and dating violence perpetration only emerged within *The Pre-Game* simulation (r = -.18). Assertiveness related to antisocial behaviors in all three simulations (r = -.14 to -.38), whereas assertiveness related to dating violence perpetration only in *The Pre-Game* (r = -.22).

Additive effects of assertiveness and tactics in relation to APB (hypothesis 3)

Both measures of APB evidenced zero-inflated distributions (antisocial behaviors skewness = 2.64; dating violence perpetration skewness = 1.83). Thus, analyses assumed a negative binomial distribution using generalized linear models, with assertiveness and tactics variety scores entered as independent variables predicting dating violence perpetration and antisocial behaviors, respectively, within each simulation. Analyses also included participant sex as a covariate. Age, ethnicity, and race were not associated with either dependent variable, *p*s > .14. As shown in Table 6, assertiveness related to antisocial behaviors in *Cheat Sheet* and *The Pre-Game*, but not in *Drunk Decisions*. Contrary to expectations, tactics variety was not related to antisocial behaviors in any simulation after accounting for the contribution of assertiveness. Assertiveness emerged as a significant predictor of dating violence perpetration in *The Pre-Game* and *Drunk Decisions*, but not in *Cheat Sheet*. Again, tactics variety did not contribute to dating violence perpetration in any models, after accounting for assertiveness and participant sex.

Exploratory Analyses

Interactive Effects of Assertiveness and Tactics variety Related to APB

An interaction term of Assertiveness x Tactics variety was entered as an independent variable to each model. No significant interactive effects emerged with antisocial behaviors, *p*s > .15. When dating violence perpetration was entered as the dependent variable, *Cheat Sheet* and *Drunk Decisions* did not show interaction effects, *p*s > .32. However, an interaction between

assertiveness and tactics variety emerged in *The Pre-Game*, B = -0.22, SE = .08, 95% CI [0.38, -0.05], *Wald* χ^2= 6.82, p = .009. At low levels (1 *SD* below mean) of assertiveness, there was no main effect of tactics, p = .77, whereas at high levels (1 *SD* above mean) of assertiveness, tactics variety related to less dating violence perpetration, B = -0.38, SE = .14, 95% CI [-0.67, -0.10], *Wald* χ^2= 7.00, p = .008.

Simulation Differences by Participant Sex

To examine if the relation between assertiveness and tactics variety differed by participant sex in associations with dependent variables, a triple interaction term (Assertiveness X Tactics variety X Sex) was added to each of the previous models. No triple interactions emerged with antisocial behaviors as the dependent variable, *p*s > .50, nor did simple interactions emerge between sex and assertiveness or tactics, respectively, *p*s > .15. Neither *Cheat Sheet* nor *Drunk Decisions* demonstrated significant triple interactions when dating violence perpetration was entered as the dependent variable, *p*s > .32. When triple interaction terms were dropped within each model, simple interactions with sex remained non-significant, *p*s > .47. However, a triple interaction emerged in *The Pre-Game* between participant sex, assertiveness, and tactics variety, B = 0.42, SE = .19, *Wald* χ^2= 4.96, 95% CI [0.05, 0.80], p = .026. For males, no main effects of assertiveness and tactics variety, nor their interaction, contributed to dating violence perpetration, *p*s > .09. Among females, an interaction between assertiveness and tactics occurred, such that at low levels (1 *SD* below mean) of assertiveness there was no main effect of tactics variety, p = .29, but at high levels (1 *SD* above mean) of assertiveness, more flexible use of tactics related to less dating violence perpetration, B = -0.66, SE = .26, *Wald* χ^2= 6.29, 95% CI [-1.17, -0.14], p = .012. Figure 1 depicts the triple interaction present in *The Pre-Game*.

Sensitivity Analysis and Qualitative Review of Nonresistant Respondents

Due to the nature of observational coding systems, participants could score a zero on assertiveness and/or tactics for several reasons beyond an inability to resist antisocial peer pressure, such as general confusion regarding the simulation task or a genuine desire to engage in the antisocial act. Thus, data were examined to identify students with a possible affinity or enthusiasm for the antisocial acts presented in the VR paradigm.

Participants who scored 0 on assertiveness and 0 on tactics were as follows: 52 participants (35 males, 17 females) in *The Pre-Game*, 12 participants (8 males, 4 females) in *Cheat Sheet*, and 11 participants (11 males, 0 females) in *Drunk Decisions*. Two participants scored a 0 on assertiveness and tactics across all four VR simulations, and an additional 57 participants scored a 0 on assertiveness and a 0 tactics in at least one simulation (of which 46 responded as such in only one simulation). Within *The Pre-Game*, nonresistant participants reported significantly more antisocial behaviors (M = 1.29, SD = 1.51) compared to resistant peers (M = 0.38, SD = 0.65), $t(56.35) = -4.22$, 95% CI [-1.34, -0.48], $p < .001$. No differences in dating violence perpetration emerged between groups within *The Pre-Game*. Nonresistant participants in *Cheat Sheet* did not report more antisocial behavior nor dating violence perpetration compared to resistant peers, ps > .18. Similarly, nonresistant participants in *Drunk Decisions* did not report more antisocial behaviors nor dating violence perpetration compared to resistant peers, ps > .13. These findings are somewhat consistent with the idea that some participants may have an affinity for engaging in antisocial acts, at least within *The Pre-Game*.

To better understand the nature of these nonresistant responses, audiotapes from the 59 participants were qualitatively reviewed for variations in verbalized acceptance of antisocial behaviors (i.e., agreement marked by timidity/reluctance versus enthusiastic participation).

Interestingly, almost all participants in this subsample indeed actively agreed to engage in the antisocial behaviors via verbal affirmation (e.g., “Ok, sure,” “Let’s do it.”). However, many participants added neutral statements that may hint at awareness of risk or subtle boundary-setting not captured by our tactics code, particularly in *The Pre-Game*. For example, when asked to stop for marijuana on the way to a party, one student responded with “Just make sure you get in and get out,” perhaps indicating an understanding that settings in which drugs are exchanged may be dangerous while still agreeing to the encounter. Another student responded, “I’m from Colorado, so…” while chuckling, perhaps insinuating that acceptability and consequences for such behaviors varies by setting and community values. Several students, although speaking in a confident tone, still qualified their agreement with phrases such as “I guess so, yeah,” and “ummm, ok sure.” Others centered responses around the avatar’s behaviors while not explicitly resisting themselves, such as “Ok you do you,” or “If you say so.” Many participants added phrases to encourage safer substance use such as “Let’s get an Uber [rideshare] home, though,” or asked clarification questions like, “Do you know anyone at the party?” and “Why isn’t anyone living in the house?” Such responses may suggest plans to use safety behaviors while still agreeing to participate in risky behaviors.

Given some group differences, sensitivity analyses were conducted by conservatively excluding all 59 participants who scored a 0 on assertiveness and a 0 tactics in at least one simulation, to determine if nonresistant participants were responsible for the results of hypothesized analyses. The removal of the nonresistant participants left a sample of $n = 182$. Bivariate results for hypotheses 1 and 2 are presented in Table 7. Tactics variety and assertiveness continued to moderately relate within simulation ($r = .31$ to $.39$) (hypothesis 1). However, antisocial behaviors related to assertiveness and tactics variety only in *The Pre-Game*

at the bivariate level (hypothesis 2). Regarding associations with dating violence perpetration, the pattern of results remained the same with or without the nonresistant subgroup; *The Pre-Game* was the only simulation in which significant associations emerged. No additional additive effects (hypothesis 3) emerged after removing the nonresistant subgroup, although two previously significant findings disappeared: assertiveness in *Cheat Sheet* became a non-significant contributor to antisocial behaviors after accounting for tactics and participant sex. Similarly, assertiveness no longer related to dating violence perpetration in *Drunk Decisions*.

Discussion

The current study examined late adolescents' responses to antisocial peer pressure using an observational VR paradigm. Participant responses to antisocial peer pressure previously coded for assertiveness (Sargent et al., 2020) were also coded for tactics for the present study. To date, research has largely isolated assertiveness and tactics components of teen resistance responses, with few attempts to examine how these elements function together in relation to APB. The current study examined how assertiveness scores relate to tactics scores, and how assertiveness and tactics operate together to predict APB in a sample of late adolescents.

Initial factor analyses were conducted to help clarify the extent to which adolescent responses to peer pressure operate in situation-specific and trait-like fashions in VR simulations. Results highlighted the influence of situation, such that observational ratings of assertiveness and tactics loaded onto factors reflecting individual VR scenes. This finding aligns with previous research demonstrating differential use of tactics depending on the specific antisocial behavior pressured (Kulis et al., 2008; Nichols et al., 2006; Norris et al., 2015), and extends this notion to include differential use of assertiveness across situations (Dirks et al, 2014). However, these results do not altogether negate the influence of stable personality characteristics and other trait-

level influences on adolescent responses. The initial validation study of this VR paradigm demonstrated high (r = .64) 2-month stability of total assertiveness codes, suggesting consistency of assertiveness responses within person over time. The notion that salient situational influences account for within-person variability in risk-taking and peer response is also supported by past research on sexual risk-taking (Cooper, 2010). Additionally, research on reckless driving practices among adolescent boys indicated that indices of trait-level sensation-seeking *as well as* situational influences (i.e., whether a peer or parent was present) were both related to driving speed (Arnett et al., 1997). Thus, future research must carefully consider the extent to which situational context may activate and merge with trait-level behavioral influences.

Adolescents' tactics variety and assertiveness were associated across simulations, but the patterns of associations between tactics variety and assertiveness varied, suggesting that the link between assertiveness and tactics variety may be influenced by the antisocial act and/or situational context. In *The Pre-Game*, in which substance misuse and trespassing are pressured, tactics variety and assertiveness were strongly correlated (r = .70), suggesting that teens' degree of confidence and breadth of tactics went hand in hand. Yet in *Drunk Decisions,* the link was significantly weaker (r = .49).

Inconsistent relations between tactics and assertiveness may speak to a range of social competence teens have in dealing with different situations. Teens may be particularly comfortable in certain simulations due to experience and thus respond with effective assertiveness (i.e., not overly aggressive nor passive) and skillfully selected tactics, whereas in other simulations, teens may over-rely on certain tactics, or fail to exhibit the degree of assertiveness needed. The pattern of associations between tactics and assertiveness across simulations is also important to consider in light of previous research that reported substantially

lower associations between these components (r = .14 to 23) (Nichols et al., 2006). Lower estimates in previous studies may be due to differences in the content of coding schemes, such that nonverbal components were previously included in assertiveness ratings (e.g., body posture). Additionally, the current study used continuous scoring approach when assessing tactics variety, whereas Nichols and colleagues (2006) scored this construct in a dichotomous fashion.

Associations between resistance responses and APB also appeared to vary across simulations, from non-significant to moderate in magnitude (r = -.02 to -.38). Links emerged more consistently between VR observational codes and self-reports of antisocial behaviors, as compared to VR observational codes and dating violence perpetration. This may be due, in part, to simulation content, such that most VR scenes pressured common delinquent activities rather than circumstances involving interpersonal aggression or dating violence. Alternatively, *The Pre-Game* could be interpreted as a more valid VR "item" when considering criterion validity.

Bivariate analyses indicated that tactics variety related to APB in two of the three simulations. This suggests that repertoire of strategies teens use to resist antisocial peer pressure are linked to real-life delinquent activity, in line with previous research (Kulis et al., 2008; Wolfe et al., 2012). However, contrary to hypotheses, additive effects of tactics variety did not emerge in relating to APB when accounting for assertiveness. These data support the adage "It's not what you say but how you say it." However, there are other ways to interpret these findings as well. It may be that for the *specific* simulations assessed in this study assertiveness is influential, whereas other untested antisocial pressures may render different results (e.g., refusing unwanted sexual advances).

Although exploratory, the interactive effects of tactics variety, assertiveness, and gender in associations with dating violence perpetration in *The Pre-Game* are interesting. For female

adolescents, low levels of assertiveness seemed to undercut even a highly tactics variety repertoire, whereas highly flexible resistance tactics buffered dating violence perpetration at high levels of assertiveness. One theorized link between dating violence perpetration and susceptibility to antisocial peer pressure is conceptualized as violent efforts to assert control in one's romantic relationships due to thwarted autonomy in peer contexts (Schad et al., 2008). Thus, high assertiveness in the absence of a repertoire of tactics tools may be a well-rehearsed conflict management response that is relationally abusive across romantic and peer situations, possibly characterized by high emotionality and low negotiation skills (Fernet et al., 2016). It may also be that perceived assertiveness from female adolescents is colored by gendered expectations about what is deemed as an acceptable social refusal by women. Given this finding did not replicate across situations, data may support the broader implication that associations between tactics and assertiveness (and their interplay with gender) are strongly rooted in the situation itself. For example, *The Pre-Game* simulation may in advertently function as an assessment of participants' interest in marijuana use, a known predictor of adolescent dating violence perpetration (Temple et al., 2013), and the primary antisocial behavior reported in this sample.

An important takeaway from the present research is also seen in analyses of nonresistant (i.e., low resistance) participants. Relations between tactics and assertiveness within simulations were retained after removing this subgroup, indicating that way these components relate in peer pressure contexts is not unique to nonresistant teens. However, links between assertiveness and tactics grew smaller and less varied in magnitude across the three simulations (r = .31 to .39). Additionally, without nonresistant participants, *The Pre-Game* was the only simulation in which tactics variety and assertiveness related to either measure of APB (at the bivariate level or

additively). As previously mentioned, one explanation for these results may be that some simulations function better than others to assess our intended construct; *The Pre-Game* appeared to assess antisocial peer pressure resistance with the cleanest discrimination from affinity for antisocial behavior as well as performed most consistently (with or without nonresistant respondents) across indices of construct validity. Group differences between resistant and nonresistant participants also speak to the idea that the VR paradigm elicits responses to invitations to engage in antisocial behavior broadly, with one such response being resistance. Thus, future research must consider how this tool may and may not function specifically as a measure of *resistance* to antisocial peer pressure.

Patterns of non-resistant responding also occurred most often in *The Pre-Game*, which makes sense given the majority of antisocial behaviors self-reported over the prior two months were substance use, specifically marijuana use (the general theme of *The Pre-Game*). Borrowing from item-response theory, less resistant responding in this simulation may suggest that different peer pressure situations present different levels of difficulty (Embretson & Reise, 2000), such that negotiating substance use may be more socially complex or challenging than other pressures (i.e., individuals are more likely to "miss" *The Pre-Game* item by scoring in low or less resistant ways). This specific difference may be due, at least in part, to the ambiguous nature of the scene and cultural ambivalence toward substance use among U.S. late adolescents; although risky, substance use is not universally illegal nor antisocial across contexts, whereas other acts sampled in the present VR paradigm are (e.g., sexual assault).

One interpretation of this pattern of results is that individual VR simulations may have a clear analogue with specific antisocial behaviors in real life. Findings among nonresistant participations also support the overall pattern of situation-specificity, as low resistance often

emerged in only one simulation among this subsample, rather than as a more trait-like timidity or antisocial affinity across all simulations. A potentially exciting implication of this connection pertains to the ability to assess teen resistance to additional nonresistant behaviors such as contraceptive (non)use or specific substance use (e.g., synthetic marijuana versus methamphetamines, etc.), as well as allow researchers to ethically raise the stakes of simulations to circumstances such as gang initiations, injurious peer violence, and weapons-related offenses.

Qualitatively, the frequent use of clarifying questions asked in casual and confident tones among nonresistant participants warrants careful consideration. It may be that participants are attempting to be socially savvy by "playing it cool" with no real intention of following through with the pressured behavior or hanging out with the avatar again. Semi-structured follow-up interviews after VR scenes is an interesting direction for future research that could further our understanding of how students appraise the situation and the peer avatar, as well as what participants actually planned to do next (i.e., perhaps leave the party upon arrival or anonymously report the avatar for academic dishonesty). On a positive note, the fact that a sizeable chunk of participants verbally agreed to engage in antisocial behaviors suggests that demand characteristics were not operating too strongly; participants did not appear to betray their own tendencies and resist because they felt compelled to "say the right thing" or appease the researcher.

Nevertheless, further refinement of both observational coding schemes is warranted, as they failed to capture finer variations in responding among participants low in resistance. Since so many participants indeed agreed to the antisocial behaviors, our codes of zero may have best captured agreement or antisocial tendencies, while scores of 1 better reflect the timidly resistant, less skilled caricature. Modifications to this observational code should consider how to

accurately interpret moments of silence from the participant followed by agreement (i.e., as hesitation versus confusion versus relaxed responding).

The standardized nature of our VR assessment tool was designed to mitigate potential peer confounds and provide a realistic and immersive setting. This approach theoretically elicits a variety of tactics responses, such that the avatar continues pressuring the participant with the scripted statements even if/when a participant responds with a clear, confident refusal. Thus, the assessment itself may signal participants to switch gears should they realize their current tactic or "broken record" response approach is not deterring the avatar. As such, low tactics variety scores could represent a deficit in switching approaches or inhibiting one's go-to tactic. On the other hand, the nature of this assessment paradigm may have changed the response itself, providing a possible testing effect. For example, perhaps the scripted avatar statements pulled for increases in assertiveness when faced with failure despite switching tactics (i.e., the avatar did not quit pressuring the participant until the script concluded, regardless of the effectiveness of one's resistance). These possibilities should be carefully considered in future research utilizing similar observational or role-play paradigms.

The current study has a number of strengths that contribute to the literature, namely that it is the first to measure both assertiveness and tactics in the same sample *and* link these assessments to APB. Importantly, this study also sampled four situations of antisocial peer pressure, whereas previous studies employed only two role-plays (e.g., Nichols et al., 2006; Wolfe et al., 2012; Wright et al., 2004). This is especially relevant given that we ultimately eliminated a simulation based on results of factor analyses. Future research would benefit from an iterative approach to assessment development by pursuing replications of the current research, as well as sampling a broader range of antisocial situations. Furthermore, it would be intriguing

to examine if the same situation specificity emerges when multiple VR scenes tap the same antisocial behaviors. Providing more "items" in this way may improve the accuracy of exploratory factor analyses by better assessing the entire range of this phenomenon and providing more information on poorly performing simulations.

Limitations

Despite a number of strengths, several limitations of this research should be acknowledged. The research design was correlational in nature; thus we cannot account for possible third variables responsible for associations in the current sample. For example, trait-level sensation-seeking, impulsivity, agreeableness, or affinity for antisocial behaviors (i.e., general psychopathy) may influence the relations among resistance response and APB, as could forms of clinical psychopathology, such as social anxiety. Future research would also benefit by considering additional theoretically important covariates, such as cognitive appraisals of risk. In other words, some teens may have the skills and confidence to resist but lack the wherewithal to know *when* to resist due to poor judgement regarding the dangerousness or consequences of particular acts. Although qualitative exploration and sensitivity analyses provided some clarification in the present study, future research would benefit from quantitative examination of how these components systematically influence engagement in problem behaviors.

To better understand the results of this study, future research should consider isolating situational characteristics theoretically related to differential responding. That is, although the current study points to some importance of situation specificity, it does not identify precisely what makes these situations load onto different factors. For example, peer advice in experimental gambling tasks has been shown to be more influential in uncertain situations rather than situations in which risk is known (Van Hoorn et al., 2017). Thus, it may be that VR situations

that present more ambiguous risk elicit different responses than those with clear health or social consequences. Additional investigation is warranted to examine the influence of situational factors such as the antisocial act pressured (i.e., theft, substance use, etc.), the setting in which pressure is applied (i.e., at a party versus in a car, in a group or one-on-one), and nuances in the aggressiveness of the avatar (i.e., number of threats, scripted use of language like "c'mon," and tone of voice).

Additionally, a more sensitive and nuanced measure of risky behavior, rather than the broad Yes/No survey of discrete antisocial acts used in the current study, may elucidate links between situational content and real-life problem behavior. This is particularly relevant when considering study sample. The majority of antisocial behavior reported in the current sample was marijuana use, and study sampled predominantly White, low-offending university college students. Thus, it remains unclear how generalizable these results would be when considering community samples, higher risk (i.e., justice-involved) teens, and more ethnically and racially diverse groups. Additionally, the avatars used in the VR paradigm were not matched to participants' race and ethnicity, so it remains unclear if responses were influenced by this (mis)match. This is an important consideration given research suggesting consistent tendencies to cooperate more with peers in our perceived in-group, especially in social dilemmas (Balliet et al., 2014).

Clinical Implications

In light of current regarding situation specificity, competence enhancement interventions should consider teaching and rehearsing resistance responses across a variety of situations. Clinicians should anticipate that skills and confidence likely vary across different situations, and interventions may need to actively rehearse generalizing resistance skills across contexts. Within

specific situations, current results suggest that teens' perceived assertiveness is particularly important in conferring protection against problem behaviors. Thus, adolescents may find programming that specifically incorporates confidence and assertiveness exercises particularly helpful in increasing resistance effectiveness.

As previously mentioned, follow-up interviews to explore if participant would ultimately engage in the pressured behaviors could clarify next steps in the assessment development process, as well as inform how clinical interventions approach teens low in resistance. Qualitative review of low resistance responders in the current sample hints at the idea that a one size-fits-all prevention approach is unlikely to be most effective, and that individualized attention may be warranted among more susceptible teens.

The current study also contributed to our understanding of teen's tactics repertoires, such that adolescents in the current study used, on average, fewer than three tactics within each simulation. Clinical research would benefit from examining if certain tactics are more protective against particular antisocial acts (i.e., is it helpful to match certain tactics to certain pressures) and evaluate the efficacy of interventions designed to match one's tactic to the situation.

Conclusion

The current research serves as an initial step toward integrating scientific understanding of what teens say in response to antisocial peer pressure and how they say it. Notably, the magnitude of associations between tactics variety and assertiveness varied across VR scenes, and results of the current study emphasize that how teens respond to antisocial peer pressure appears influenced by the situation itself. Within individual simulations of antisocial peer pressure, teens' degree of assertiveness appears most influential in relating to problem behaviors, although assertiveness contributed to associations with APB inconsistently across simulations (four out of

six models). Thus, we interpret the relative importance of assertiveness cautiously. Clinical science efforts to understand and equip teens with effective resistance skills should continue to clarify the influence of situational factors on adolescents' social responses.

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Table 1

Associations among assertiveness, tactics variety, and concurrent problem behaviors by simulation

	1.	*2.*	*3.*	*4.*	*5.*	*6.*	*7.*	*8.*	*M (SD)*
1. PG assertiveness	--								1.19 (0.95)
2. CS assertiveness	.33**	--							2.23 (0.94)
3. DD assertiveness	.41**	.46**	--						2.08 (0.93)
4. PG tactics	.70**	.34**	.33**	--					1.57 (1.11)
5. CS tactics	.25**	.59**	.29**	.29**	--				2.49 (1.00)
6. DD tactics	.34**	.29**	.49**	.42**	.36**	--			2.12 (0.97)
7. Antisocial behaviors	-.38**	-.25**	-.14*	-.36**	-.15*	-.12	--		0.58 (0.98)
8. Dating violence perpetration	-.22**	-.05	-.09	-.18**	-.02	-.07	.30**	--	5.25 (7.41)

Note. Results reflect full analytic sample (n = 241). PG = *The Pre-Game*, CS = *Cheat Sheet*, DD = *Drunk Decisions*. Assertiveness scores could range from 0-3, tactics scores could range from 0-8, antisocial behaviors scores could range from 0-9, and dating violence perpetration could range from 0-100.

*$p < .05$
**$p < .01$

Table 2

Pattern Matrix for 2-factor solution

	Factor	
	1	*2*
1. CS assertiveness	.915	
2. CS tactics	.843	-.140
3. PT assertiveness	.620	.181
4. DD assertiveness	.501	.315
5. PG tactics		.896
6. PG assertiveness		.889
7. PT tactics		.498
8. DD tactics	.292	.457

Note. PT = *Petty Theft*; PG = *The Pre-Game*, CS = *Cheat Sheet*, DD = *Drunk Decisions*. Coefficients with absolute values smaller than .10 not reported.

Table 3

Pattern Matrix for 3-factor solution

	Factor		
	1	*2*	*3*
1. CS assertiveness	.902		
2. CS tactics	.870		-.213
3. PT assertiveness	.533		.474
4. DD assertiveness	.483	.289	
5. PG tactics		.912	
6. PG assertiveness		.906	
7. DD tactics	.306	.511	
8. PT tactics	-.145		.964

Note. PT = *Petty Theft*; PG = *The Pre-Game*, CS = *Cheat Sheet*, DD = *Drunk Decisions*. Coefficients with absolute values smaller than .10 not reported.

Table 4

Pattern Matrix for four-factor solution

	Factor			
	1	*2*	*3*	*4*
1. CS assertiveness	.916			
2. CS tactics	.881			-.209
3. PT assertiveness	.480			.479
4. PG tactics		.905		
5. PG assertiveness		.899		
6. DD tactics	-.109		.939	
7. DD assertiveness	.119		.784	
8. PT tactics	-.162			.970

Note. PT = *Petty Theft*; PG = *The Pre-Game*, CS = *Cheat Sheet*, DD = *Drunk Decisions*. Coefficients with absolute values smaller than .10 not reported.

Table 5

Pattern Matrix for three-factor solution excluding Petty Theft simulation observational ratings

	Factor		
	1	*2*	*3*
1. PG assertiveness	.923		
2. PG tactics	.916		
3. CS tactics		.922	
4. CS assertiveness		.853	
5. DD tactics			.881
6. DD assertiveness			.842

Note. PG = *The Pre-Game*, CS = *Cheat Sheet*, DD = *Drunk Decisions*. Coefficients with absolute values smaller than .10 not reported.

Table 6

Negative binomial generalized linear models estimating additive effects of assertiveness and tactics to APB by simulation

	Antisocial behaviors					*Dating violence perpetration*				
	B	*SE*	*Wald* χ^2	*95% CI*	R^2 *increase*	*B*	*SE*	*Wald* χ^2	*95% CI*	R^2 *increase*
Intercept	0.29	.28	1.05	[-0.26, 0.83]	--	1.63	.21	61.98***	[1.22, 2.04]	--
Participant sex	-0.32	.22	2.09	[-0.76, 0.12]	.008	0.48	.14	11.16***	[0.20, 0.77]	-.165
CS assertiveness	-0.37	.14	6.80**	[-0.64, -0.09]	.037	-0.14	.10	1.79	[-0.33, 0.06]	.004
CS tactics	0.03	.13	0.04	[-0.23, 0.28]	.000	-0.02	.09	0.04	[-0.16, 0.20]	-.000
Intercept	-0.00	.26	0.00	[-0.52, 0.51]	--	1.92	.20	93.20***	[1.53, 2.31]	--
Participant sex	-0.35	.23	2.22	[-0.80, 0.11]	.009	0.62	.15	16.73***	[0.32, 0.92]	.038
DD assertiveness	-0.14	.14	1.12	[-0.41, 0.12]	.006	-0.19	.09	4.11*	[-0.37, -0.01]	.004
DD tactics	-0.05	.14	0.14	[-0.32, 0.22]	.001	-0.12	.09	1.71	[-0.30, 0.06]	.004
Intercept	0.27	.18	2.18	[-0.87, 0.62]	--	1.84	.15	159.10***	[1.55, 2.13]	--
Participant sex	0.04	.24	0.34	[-0.51, 0.42]	.000	0.53	.15	13.11***	[0.24, 0.81]	.049
PG assertiveness	-0.63	.21	9.13**	[-1.04, -0.22]	.025	-0.33	.11	9.83**	[-0.54, -0.12]	.026
PG tactics	-0.20	.15	1.76	[-0.51, 0.10]	.015	-0.10	.09	1.09	[-0.27, 0.08]	.002

Note. Participant sex coded female = 0, male = 1.
*$p < .05$
**$p < .01$
***$p < .001$

Table 7

Associations among assertiveness, tactics variety, and concurrent problem behaviors by simulation without nonresistant subgroup

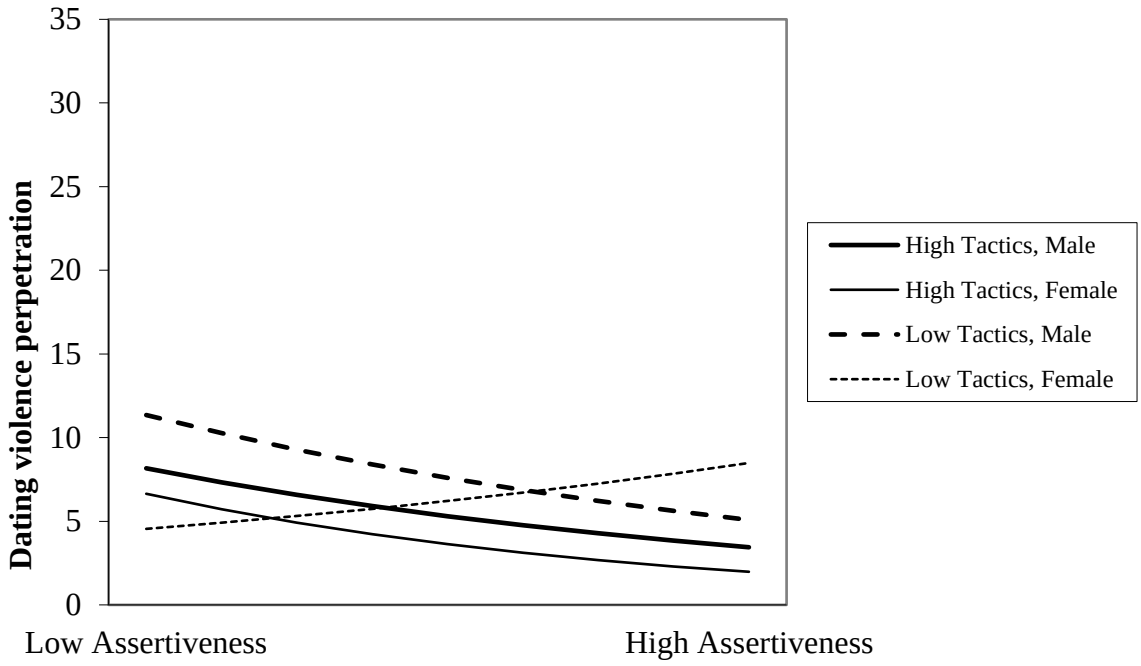
	1.	*2.*	*3.*	*4.*	*5.*	*6.*	*7.*	*8.*
1. PG assertiveness	--							
2. CS assertiveness	.17*	--						
3. DD assertiveness	.28**	.30**	--					
4. PG tactics	.39**	.11	.08	--				
5. CS tactics	.09	.32**	.13	.11	--			
6. DD tactics	.16*	.01	.31**	.26**	.18*	--		
7. Antisocial behaviors	-.26**	-.05	.07	-.17*	-.05	.09	--	
8. Dating violence perpetration	-.23**	-.07	-.05	-.16*	-.04	-.03	.33**	--

Note. Sample reflects sensitivity analyses without nonresistant subgroup, $n = 182$. PG = *The Pre-Game*, CS = *Cheat Sheet*, DD = *Drunk Decisions*.

*$p < .05$
**$p < .01$

Figure 1

Triple interaction of assertiveness, tactics, and participant sex in relation to dating violence perpetration in 'The Pre-Game'



Note. High and low estimates denote 1 *SD* above/below mean levels of variable, respectively. Y-axis truncated to reflect actual range of reported perpetration (0-34) rather than full possible range (0-100).

Appendix A

Honest Conduct Scale

Directions: Please indicate if you have or have not partaken in the following activities in the *past two months*.

	In the past two months, have you:	1	0
1.	Taken anything from school, home, or a store that did not belong to you?	Yes	No
2.	Cheated on tests?	Yes	No
3.	Written things or spray painted on walls or sidewalks or cars, where you were not supposed to do that?	Yes	No
4.	Picked on another person by chasing or grabbing him or her or by making him or her do something he or she didn't want to do?	Yes	No
5.	Tried to scare or make another person feel bad by calling him or her names, saying mean things, or saying you didn't want him or her around?	Yes	No
6.	On purpose broken, damaged or destroyed something that belonged to someone else?	Yes	No
7.	Hit, slapped, or pushed or gotten into a physical fight with someone who is not a romantic partner?	Yes	No
8.	Smoked marijuana or taken any other drugs (that were not prescribed medication)?	Yes	No
9.	Been arrested or taken into custody by the police?	Yes	No

Appendix B

Conflict in Adolescent Dating Relationships Inventory

Directions: Tell us your best estimate of how often these things have happened with a current or former dating partner in the past *2 months*.

During a conflict or argument with a current or former partner *in the past 2 months***:**

1.	I touched them sexually when they didn't want me to.	Never 0	Once 1	Twice 2	Three times 3	Four or more 4
2.	I tried to turn their friends against them.	Never 0	Once 1	Twice 2	Three times 3	Four or more 4
3.	I did something to make them feel jealous.	Never 0	Once 1	Twice 2	Three times 3	Four or more 4
4.	I destroyed or threatened to destroy something they valued.	Never 0	Once 1	Twice 2	Three times 3	Four or more 4
5.	I brought up something bad that they had done in the past.	Never 0	Once 1	Twice 2	Three times 3	Four or more 4
6.	I threw something at them.	Never 0	Once 1	Twice 2	Three times 3	Four or more 4
7.	I said things just to make them angry.	Never 0	Once 1	Twice 2	Three times 3	Four or more 4
8.	I spoke to them in a hostile or mean tone of voice.	Never 0	Once 1	Twice 2	Three times 3	Four or more 4
9.	I forced them to have sex when they didn't want to.	Never 0	Once 1	Twice 2	Three times 3	Four or more 4
10.	I threatened them in an attempt to have sex with them.	Never 0	Once 1	Twice 2	Three times 3	Four or more 4
11.	I insulted them with put-downs.	Never 0	Once 1	Twice 2	Three times 3	Four or more 4
12.	I kissed them when they didn't want me to.	Never 0	Once 1	Twice 2	Three times 3	Four or more 4
13.	I said things to their friends about them to turn their friends against them.	Never 0	Once 1	Twice 2	Three times 3	Four or more 4
14.	I ridiculed or made fun of them in front of others.	Never 0	Once 1	Twice 2	Three times 3	Four or more 4

15. I kept track of who they were with and where they were.	Never 0	Once 1	Twice 2	Three times 3	Four or more 4
16. I blamed them for the problem.	Never 0	Once 1	Twice 2	Three times 3	Four or more 4
17. I kicked, hit or punched them.	Never 0	Once 1	Twice 2	Three times 3	Four or more 4
18. I accused them of flirting with another person.	Never 0	Once 1	Twice 2	Three times 3	Four or more 4
19. I deliberately tried to frighten them.	Never 0	Once 1	Twice 2	Three times 3	Four or more 4
20. I slapped them or pulled their hair.	Never 0	Once 1	Twice 2	Three times 3	Four or more 4
21. I threatened to hurt them.	Never 0	Once 1	Twice 2	Three times 3	Four or more 4
22. I threatened to end the relationship.	Never 0	Once 1	Twice 2	Three times 3	Four or more 4
23. I threatened to hit them or throw something at them.	Never 0	Once 1	Twice 2	Three times 3	Four or more 4
24. I pushed, shoved or shook them.	Never 0	Once 1	Twice 2	Three times 3	Four or more 4
25. I spread rumours about them.	Never 0	Once 1	Twice 2	Three times 3	Four or more 4

Appendix C

VR negative peer pressure simulation scripts and actor adherence to scripts

Simulation	*Actor statements*	*Script adherence*
Petty Theft	Introduction: Shoot, I don't think I have enough cash for parking. 1. Let's just run back inside, I'll grab some cash from my roommate's desk. 2. Yeah, they're not around today, so it'll be fine. 3. Yeah, s/he won't even notice, he/she's always leaving money laying around. 4. It's not like s/he's strapped for cash, I mean his/her family is loaded. It's not a big deal. 5. If s/he notices, we'll just say we were planning to pay it back.	93.5%
Cheat Sheet	Introduction: This math class is so hard and we're both not doing that great, don't you think? 1. Well I should tell you something. I was in office hours today for my midterm and the professor left the room. I thought she left the answer key to the midterm on her desk, but it wasn't. 2. It was actually the final, I took pictures of it while she was gone. This can help us study. 3. Her tests are never fair, she owes us; this will make it fair. 4. Think about it like a study sheet. You just know what to focus on now. 5. I haven't told anyone else about this, it's just for us. I mean c'mon we have to do this to pass.	99.6%
The Pre-Game	Introduction: So excited for the party tonight, aren't you? 1. The buzz about this party is crazy. I heard not a lot of freshmen even get invited. 2. Yeah, it's supposed to be at that big house that no one's been living in for a while. 3. Let's stop by my friend's place on the way. He's got some weed and I said we'd bring it. 4. I know this isn't really your thing, but it's no fun getting high alone. 5. Just come check out the party, drink a little, and see what happens. It'll be fun.	98.9%

Drunk Decisions	Introduction: Did you see that girl Erica in there? 1. I wanted to tell you something inside, but it was too loud. I'm really interested in her. 2. She's so hot. Do you mind going back into the party for a little bit so I can see if she's into me? 3. I really want to hook up with her. Did you see the way she kissed me? I think she really likes me. 4. She's really drunk, so I definitely think I can make this happen. 5. I'm a little drunk but I still know what's going on. 6. I'm going to go back in and get her alone.	98.5%

**Note. Script adherence calculated as percent of cases in which the actor said all scripted statements at baseline assessment.*

Appendix D

Peer pressure observational coding materials

Resistance assertiveness

Responses to peer pressure assessed on dimension of resistance, where 0 is very agreeable and 4 is highly resistant.

0 = No resistance; participant verbally responds in highly agreeable fashion, evidences no discomfort engaging in antisocial behavior or allowing actor to engage in it.
*This code should also be used for non-responsive participants.

1 = Very few resistant statements made; demonstrated noticeable hesitancy making resistant statements. Participant goes back and forth between resistant and agreeable statements; resistant statements infrequent, inconsistent, and vague. Interaction may be marked by noncommittal, neutral language.

2 = Participant makes several resistant statements but lacks complete confidence/clarity in making them to deserve 4 (e.g., refusal message is consistent, but confidence of tone or volume is not completely present throughout simulation).

3 = Participant consistently, assertively resists actor statements. Does not deviate from refusal message at any point in simulation. Statements are made with confidence and clarity throughout interaction.

Resistance tactics

Tactics should be coded without regard for perceived effectiveness, confidence, or skillfulness.

Resistance tactics will be tallied individually for each simulation; (0-No limit) for each tactic within each simulation. Resistance tactics categories will then be summed as number of divergent tactics used *across* all 4 simulations (range 0-8), as well as the number of divergent tactics per each simulation, summed across simulations (range 0-32).

Tactic	Explanation	Example
Simple refusal	Clear refusal to engage in activity by saying no without elaboration	"No, I don't want to." "I'm not going." "I'm good."
Qualified reasoning	Refusal based on *personal* justification or boundary	"I'm not a cheater." "I don't smoke." "I don't feel right about that."
Moral persuasion	Discusses behavior as immoral or unethical; May attempt to talk *peer* out of behavior	"That's not a good idea." "We/You shouldn't do that." "That's rape." [or other naming behavior] "That's stealing, you can't just take their $."
Bargaining	Setting boundary while engaging in some component of peer pressure	"I'll drink, but I'm not gonna smoke." "I'll go back in with you." "As long as you pay them back."
Suggesting alternatives	Using other activities as replacement; problem-solving to change situation	"Nah, let's just go to my place instead." "Wait until she's sober, check in tomorrow." "Ask them first."
Delaying/excuses	Implying willingness to engage later, no clear timeframe; giving benign reason why they are unable	"I just need to get home." "Ok we'll see." "I'm busy tonight" "I'm already late to class."
Consideration of consequences	Articulating punishment/consequence	"We could get caught." "My parents would kill me." "We could get suspended."
Other*		[Focusing on irrelevant aspect of simulation; Insulting avatar; Ending simulation early; general disgust]*Do not count unqualified agreement or clarifying questions

Appendix E

Supplemental Tables

Table 1

Pattern Matrix for 2-factor solution using Principal Axis Factoring

		Factor	
		1	*2*
1.	CS assertiveness	.914	-.110
2.	CS tactics	.605	
3.	PT assertiveness	.567	.136
4.	DD assertiveness	.465	.247
5.	PG tactics		.854
6.	PG assertiveness		.804
7.	DD tactics	.291	.344
8.	PT tactics	.165	.245

Note. Extraction converged in 14 iterations; rotation converged in 3 iterations. PT = *Petty Theft*; PG = *The Pre-Game*, CS = *Cheat Sheet*, DD = *Drunk Decisions*. Coefficients with absolute values smaller than .10 not reported.

Table 2

Pattern Matrix for 3-factor solution using Principal Axis Factoring

	Factor		
	1	*2*	*3*
1. PG tactics	.930		
2. PG assertiveness	.699		.132
3. CS assertiveness		.907	
4. CS tactics		.652	
5. DD assertiveness			.847
6. DD tactics	.181		.467
7. PT assertiveness		.312	.380
8. PT tactics	.165		.231

Note. Extraction terminated; communalities exceeded 1.0. Rotation converged in 5 iterations. PT = *Petty Theft*; PG = *The Pre-Game*, CS = *Cheat Sheet*, DD = *Drunk Decisions*. Coefficients with absolute values smaller than .10 not reported.

Table 3

Pattern Matrix for four-factor solution using Principal Axis Factoring

	Factor			
	1	*2*	*3*	*4*
1. PG tactics	.876			
2. PG assertiveness	.754		.113	
3. CS tactics		.782	-.189	.132
4. CS assertiveness		.726	.283	-.111
5. PT assertiveness			.825	
6. DD assertiveness			.427	.411
7. PT tactics	.142		.318	
8. DD tactics				.767

Note. Extraction terminated; communalities exceeded 1.0. Rotation converged in 6 iterations. PT = *Petty Theft*; PG = *The Pre-Game*, CS = *Cheat Sheet*, DD = *Drunk Decisions*. Coefficients with absolute values smaller than .10 not reported.