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Hypomanic Tendencies and Lifetime Aggression

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A B S T R A C T

Background: Irritability has been identified a mood-related symptom of the bipolar spectrum disorders, but associations have not been firmly established between (hypo)manic attributes and physical aggression. The Hypomanic Personality Scale (HPS; Eckblad & Chapman, 1986) is a dimensional measure which has been shown in longitudinal studies to predict future bipolar spectrum diagnoses or symptomatology. This study examined relationships between HPS and selected lifetime aggression indicators. HPS factor scores were derived from three different analytic models (Rawlings, Barrantes-Vidal, Claridge, McCreery, & Galanos, 2000; Schalet, Durbin, & Revelle, 2011; & Stanton, McArtor, & Watson, 2017).

Methods: College (N = 408) and MTurk (N = 324) samples were examined. The criterion measures provided estimates of the frequency, consequences, and precipitating events of past aggression.

Results: HPS associations with the aggression indicators were pervasive and strong (medium to large) in their effect sizes in the MTurk sample. These associations tended to be stronger for the men. The odds of prior lethal threats and/or injuries to other(s) were three to five times higher for respondents in this MTurk sample with an HPS score above 25 as compared to the remaining sample. Factor scores measuring emotional volatility, inflated social confidence, and activation levels were most closely associated with aggressive tendencies. The HPS-20 (Meads & Bentall, 2008) was found to approximate the HPS outcomes.

Limitations: This cross-sectional methodology precluded inferences regarding the directionality of the associations. The accuracy of these retrospective self-reports could not be verified.

Conclusions: Hypomania appears to be associated with both irritability and self-reported acts of lifetime physical aggression.

1. Introduction

One criterion of manic episodes in the Diagnostic and Statistical Manual (DSM-5; American Psychiatric Association, 2013) is persistent elevated or irritable mood. Hypomanic episodes are less severe, shorter in duration, and not associated with marked social or occupational impairment (O'Sullivan, Szczepanowski, El-Deredy, Mason, & Bentall, 2011). The Both clinical and subclinical forms of bipolar disturbance pose concern since patients and family often disregard the symptoms due to the short-term benefits that can accrue from boundless energy and mood inflation (Bowden, 2005; Furnham, Batey, Anand, & Manfield, 2008; Hirschfeld, 2014). Symptoms such as irritability strain relationships and wither social support (Devlin, Zaki, Ong, & Gruber, 2016; Molz et al., 2013; Schalet et al., 2011). All symptoms on the bipolar spectrum warrant concern given the severe later destabilization those attributes can portend (Hofmann & Meyer, 2006; Kwapil et al., 2000; Schalet et al., 2011). While irritability represents a core symptom of bipolar spectrum disturbance, the extent to which it extends to physical aggression remain incompletely understood.

1.1. Bipolar Spectrum Disorders and Aggression

A paradox of hypomania lies in the many adaptive attributes that seem to co-occur with the maladjustment. Why do such naturally upbeat, affable, confident, and energized people seem to engender recurrent tumult in their lives? These negative outcomes seem to flow from extreme behavioral assertions of these core hypomanic penchants within the context of irritable or euphoric temperament. Bipolar spectrum patients often exhibit elevated trait anger (Ballester et al., 2014; Dervic et al., 2015; Dolenc et al., 2015; Grunebaum et al., 2006; Hantouche & Perugi, 2012; Meter et al., 2016; Molz et al., 2013; Savitz, van der Merwe, & Ramesar, 2008) and physical aggression (Corrigan & Watson, 2005; Grunebaum et al., 2006; Perroud, Baud, Mouthon, Courtet, & Malafosse, 2011). Aggression risks appeared to be especially elevated during acute bipolar mood episodes in one longitudinal analysis (Ballester et al., 2014).

Attempts to establish nexuses between mental illness and violence remain the subject of contention. Monahan (1992) found rates of violence that were roughly five times higher among people who met criteria for bipolar disorder. The question subsequently pivoted to the many factors that might influence this relationship. For example, alcohol and drug abuse alone in Monahan's analysis were associated with a 12- to 16-fold increase in the reported outcomes. One 30-year longitudinal analysis of 314 Swedish hospital-discharged bipolar patients found that the violent crime discrepancy between the patients (8.4%) and general population non-patients (3.5%) was eliminated after

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control for substance abuse comorbidity (Fazel, Lichtenstein, Grann, Goodwin, & Långström, 2010). A literature search would attest to the extensive list of identified aggression mediators and modulators. Violence cannot be meaningfully attributed to any specific DSM-5 disorder given the confluence of factors that govern the behavior. The bipolar spectrum disorders may, however, represent one risk factor with this matrix of precipitants.

Theoretical frameworks for understanding relationships between bipolar motives, emotions, and behaviors are emerging. Neuroscience efforts have focused on neural pathways that appear to govern the expression of hostility experienced by bipolar patients in extreme goal-pursuit. Left prefrontal lobe activation has served as a focal interest given its importance in the behavioral activation system that governs appetitive and incentive-based approach behavior (Gray, 1990). This activation pattern and associated approach behavior can co-occur with emotions that can range from anger to euphoria (Cassidy, Forest, Murry, & Carroll, 1998; Depue & Iacono, 1989; Harmon-Jones & Sigelman, 2001). Bipolar disorder is distinguished by excessive goal-pursuit and extreme emotional highs and lows. Asymmetric prefrontal activation (left over right hemisphere) has been identified among manic-prone participants exposed to laboratory-induced anger (Harmon-Jones et al., 2002). Depression-prone counterparts exhibited the opposite prefrontal asysmmetry often associated with social withdrawal via the behavioral inhibition system. While theoretical models such as this hold promise in conceptualizing these biobehavioral linkages, the extent to which penchants toward physical aggression pose a significant concern in bipolar spectrum disturbance, particularly subclinical variants, warrants further explication.

1.2. Hypomania Measurement Considerations

Hypomania research has relied on a wide range of self-report indices to identify bipolar symptomatology. A recent analysis illustrated the many available indices and modest content overlap found in seven of the most widely used scales (Chrobak, Siwek, Dudek, & Rybakowski, 2018). The mean item overlap for 64 different (hypo)manic symptoms ranged from 29% to 48%, with only 6% of the items appearing universally. This study examined the Hypomanic Personality Scale (HPS; Eckblad & Chapman, 1986) given its wide usage and ability to canvass hypomanic trait attributes that are manifested in both subclinical and clinical settings. The HPS is a 48-item inventory with a dichotomous scoring metric that has been the subject of extensive research. An HPS score threshold (> 35) was identified during development as a bipolar disorder risk indicator. Respondents with HPS elevations in the normative college sample were found to have experienced diagnosable hypomanic episodes (77% versus 0% for controls) and other forms of maladjustment (e.g., substance abuse, schizotypal symptoms). Control participants were defined by scores less than $+.5$ *SD* from the mean. A 13-year longitudinal follow-up of these original high and low risk cohorts (Kwapil et al., 2000) found that 28% (versus 3%) of this high risk group subsequently met diagnostic criteria for bipolar disorder. A different 3-year longitudinal analysis (Walsh, DeGeorge, Barrantes-Vidal, & Kwapil, 2015) of college students found that 14% of those generating high ($= > 1.5$ *SD*) HPS scores developed bipolar disorder during the follow-up period ($OR = 3.25, p < .01$). Risks were elevated as well for a range of comorbid concerns including substance abuse and personality maladjustment.

There has been consistency in the trait attributes associated with the HPS by different research teams in both college (Durbin, Schalet, Hayden, Simpson, & Jordan, 2009; extraversion, creative interests, exhibitionism, entitlement, positive temperament, impulsivity, etc.) and national (Stanton et al., 2017; extraversion, excitement seeking, gregariousness, amorality, immodesty, uncooperativeness, risk taking, etc.) samples. Interactions between these hypomanic traits and the emotional state of the individual appear critical in differentiating adaptive from maladaptive outcomes. DSM-5 reliance on the term "irritability" as a (hypo)manic feature emphasizes the reactive nature of the mood symptom. While samples have varied in their identification of trait anger as the underlying emotional tone, research focus has shifted over time toward an exploration of how (hypo)manic mood (Gruber, Oveis, Keltner, & Johnson, 2008) is manifested in individual reactivity to welcome and unwelcome events. In this regard, a risk for decompensation has come paradoxically from excessive positive emotionality in response to reward (Sutton & Johnson, 2002; Trevisani, Johnson, & Carver, 2008). This accelerated approach behavior (Campellone, Peckham, & Johnson, 2018) and goal pursuit (Johnson, 2005) has been associated with magnified impulsivity during positive affect states (Johnson, Carver, Mulé, & Joorman, 2013).

While the HPS was conceptualized as a unidimensional index, factor analyses have subsequently differentiate the total item content into meaningful subfacets. Analytic teams have generated models with three (Schalet et al., 2011), four (Rawlings et al., 2000), and five (Stanton et al., 2017) factors. Factor scores hold potential value in identifying links between selective hypomania attributes and maladjustment indicators.

1.3. Study Objectives

This study examined associations between hypomania symptomatology and self-reported acts of lifetime aggression. These analyses were designed to extend the hypomania literature in six areas: 1) Is there an association between hypomanic attributes and lifetime aggression; 2) To what extent are the odds of past aggressive acts raised by high HPS scores? 3) Are associations between hypomanic attributes and lifetime aggression similar in strength for men and women?; 4) Do selective HPS factor scores account for unshared variance in lifetime aggression?; 5) Do current HPS factor solutions differ substantially in their ability to account for variance in lifetime aggression?; 6) Does a short-form version of the HPS approximate the strengths of associations found for the full measure with aggression indicators.

2. Methods

2.1. Participants and Procedure

Participation in this survey study required completion of the HPS, HPS-20 (Meads & Bentall, 2008), Lifetime Assessment of Violent Acts (LAVA; King, Russell, & Bailly, 2017), and Buss-Perry Aggression Questionnaire (Buss & Perry, 1992). This project was approved by our university IRB, and informed consent was obtained for all of the respondents.

The college sample ($n = 408$) was compensated with extra credit in their respective Psychology course. A subset of respondents ($n = 62$) were excluded for failing to meet the LAVA consistency standard (see Method). The college sample varied in gender (70.5%, women; 29.5%, men), age ($M = 19.98$, $SD = 3.22$) and ethnicity (White, 87.2%; Black, 3.2%; Hispanic, 3.0%; Asian, 2.2%; American Indian, 1.5%; & Multi-Racial, 2.9%).

MTurk (Amazon's Mechanical Turk) was used to generate a general public sample. MTurk has been reviewed favorably as a crowdsourcing research platform (Buhrmester, Kwang, & Gosling, 2011; Gosling, Vazire, Srivastava, & John, 2004; Paolacci, Chandler, & Ipeirotis, 2010). A concern regarding this methodology has been the potential threat posed by international bot farms that rely on Virtual Private Servers (VPS) and IP addresses to disguise their origination and geolocation (Kennedy, Clifford, Burleigh, Waggoner, & Jewell, 2018). The potential threat posed by international bot farms has been heightened in a recent suggestions that 1% to 2.5% of MTurk responses may originate from suspicious international geolocations (Kennedy et al., 2018; Litman, 2018). This MTurk sample was restricted to respondents of at least 18 years of age who completed the survey from the United States. Online proxy/VPN detection software (https://iphub.info) was relied upon as a

MTurk best practice (Burleigh, Kennedy, & Clifford, 2018) to identify and exclude a subset (n = 16) of initial respondents who attempted to disguise their international origin. IP addresses and/or geolocations were not duplicated in this sample. Additional precautions were taken to exclude respondents who failed an attention check item (n = 4) or the LAVA consistency standard (n = 38) described in the Method. This MTurk sample (n = 324) varied in gender (54.0%, women; 46.0%, men), age (M = 36.12, SD = 13.09) and ethnicity (White, 70.7%; Black, 7.1%; Hispanic, 6.2%; Asian, 9.0%; American Indian, 3.1%; & Multi-Racial, 3.9%).

2.2. Measures

2.2.1. Hypomanic Personality Scale

The HPS is an internally consistent (α = 0.87) scale with high 15-week test-retest (r = .81) reliability (Eckblad & Chapman, 1986). Protocols with up to three missing scores on the 48 items were retained in these analyses using a value of .5 for those items. This study examined three different HPS factor structures. The three-factor model (Schalet et al., 2011) was derived from an undergraduate sample (n = 884) and included the dimensions of Mood Volatility (affective, behavioral, and/or cognitive instability), Social Vitality (gregariousness and social engagement), and Excitement (energetic and cheerful demeanor). The four-factor model (Rawlings et al., 2000) was derived from a British sample of student and health care professionals (n = 1,073) and included the dimensions of Affective Moodiness (irritability and restlessness), Cognitive Component (perceived creativity, productivity, and ability to persuade and inspire others), Hypersociability (high activity and need for attention), and Ordinariness (view of self as ordinary). The five-factor model (Stanton et al., 2017) was derived from an MTurk sample (n = 737) which was screened to assure extensive mental health diagnostic and treatment histories. This clinical model generated dimensions ofActivation (excessive energy and restlessness), Lability (affective variability), Charisma (social confidence and perceived leadership ability), Intellectual Confidence (perceived capability and cleverness), and Modesty (view of self as average and ordinary). Scale descriptions were greatly enhanced in this model through correlates with the big five personality domains and facets.

2.2.2. Hypomanic Personality Scale-Brief

A brief form of the HPS (HPS-20; Meads & Bentall, 2008) has been developed to facilitate research on affective disorders. The HPS content domain was reduced iteratively using item response theory. Subsequent research has extended psychometric support for the HPS-20 (Sperry, Walsh, & Kwapil, 2015) which has been used in many studies (Hawke, Provencher, & Arntz, 2011; McCarthy-Jones, Knowles, & Rowse, 2012; O'Sullivan et al., 2011; Pavlickova, Turnbull, & Bentall, 2014).

2.2.3. Lifetime Assessment of Violent Acts Inventory

The LAVA (King, Russell et al., 2017) is a retrospective self-report inventory developed to describe prior acts of physical aggression along with antecedent circumstances and consequences associated with those incidents. The Lifetime Aggressive Acts (LAGG) score represents the number of prior physical acts of aggression. Injury to Other (ITO) scores are calculated as the sum total of physical maladies (broken bone, bruise, black eye, head or facial injury, brain injury, superficial cut, deep cut, internal injury, loss of consciousness, ambulance call, emergency room treatment, or hospitalization) inflicted on other(s) in up to five prior acts of violence. ITO scores can range from 0 to 60 (5 acts x 12 injuries). Trouble from Violent Acts (TVA) scores are scaled from 0 to 6 ("*Have you ever been in trouble because of violent behavior?*" 0 = no; 1 = once; 2 = twice; 4 = three to five times; 6 = > five times). The Motivated Acts (MAGG) index identifies extenuating circumstances associated with up to five separate prior acts (e.g., reactions to slights, intimate partner conflict, alcohol intoxication, lethal intent). The MAGG triggers and/or extenuating circumstances also cluster into Reactive (*I felt personally insulted*; *I felt verbally or physically harassed; I felt threatened with physical harm to self or others),* Intimate Partner (*I felt threatened by the loss of a relationship; I felt betrayed by someone; The target of the act was a romantic partner*), Alcohol-Related (*I was under the influence of alcohol and not/probably/ definitely over the legal limit*), and Lethal Risk (*I threatened to kill someone; I used a weapon to threaten someone; I used a weapon against someone*) acts of violence. MAGG and LAGG provide a useful method to identify frank response inconsistencies (i.e., LAGG > 0, MA = 0; LAGG = 0, MA > 0). These exclusions have involved about 10% to 15% of respondents in prior LAVA samples.

Test-retest (one week) reliability estimates were generated from the normative college sample for a number of the LAVA indices (MAGG, r = .74; ITO, r = .83; Reactive, r = .73; IPV, r = .52; Alcohol, r = .74; Lethal, r = .72). These coefficients have been replicated in a second college sample (King & Russell, 2018). LAVA scores have been linked to multiple forms of childhood maltreatment (King, Ballantyne et al., 2017), extreme gun enthusiasm (Matson, Russell, & King, 2018), executive functioning deficits (King, Breen, Russell, Nerpel, & Pogalz, 2017), and corporal punishment experiences during upbringing (King et al., 2018). Total LAVA scores have been found to predict both baseline (r = .41, d = .90) and laboratory-provoked shock intensities (r = .40, d = .87) inflicted on an opponent using the Taylor Aggression Paradigm (King & Russell, 2019).

2.2.4. Buss-Perry Aggression Questionnaire

The BPAQ (Buss & Perry, 1992; Buss & Warren, 2000) is a 29-item measure of trait aggression that cluster into subscales for Physical Aggression, Verbal Aggression, Trait Anger, and Trait Hostility. BPAQ items are scored on a five-point metric with subscale reliabilities ranged from .72 to .89. BPAQ scores have been shown to reflect aggressive tendencies in a many different settings and high risk groups (Archer & Webb, 2006; Gerevich, Bacskai, & Czobor, 2007; O'Connor, Archer, & Wu, 2001).

2.3. Analytic Strategy

Dimensional relationships between total and factor HPS scores using three different analytic models and the aggression indicators were first examined through correlation analyses. Square root transformations were applied for predictor and criterion variables with skewness greater than +2. Respondent age was controlled in these analyses, and gender differences were identified in these bivariate relationships. A Bonferroni error rate alpha adjustment (p < .006) was used since each HPS variable was correlated with eight different aggression indicators.The significance of the differences between selected correlation coefficients were calculated using an online program (Lenhard & Lenhard, 2014). Regression analyses were used to identify factor scores that accounted for unshared variance in the trait aggression indicators. The normative score for each LAVA index was 0, and an elevation (> 0) on any scale indicated that one or more of the specified acts occurred at some time in the past. The relative risk (*RR*) statistic provided an estimate of the change in probability of having a particular LAVA elevation (e.g., one or more injuries inflicted during a dispute) as a function of scoring above or below a specified HPS threshold.

3. Results

3.1. Descriptive Statistics

Total 48-item HPS scores were examined along with the HPS-20 short-form version (Meads & Bentall, 2008) of the instrument (Table 1). Factor scores were generated using the solutions provided by three different research teams (Rawlings et al., 2000; Schalet et al., 2011; & Stanton et al., 2017). The HPS and HPS-20 were highly correlated (r = .93, p < .001).

Table 1
Descriptive Statistics for HPS Total and Factor Scores

HPS Predictor Indices	Label	α	*M*	*SD*	Range	Skew	Gender Effect	
							p	*d*
	College Sample (*N* = 408)							
HPS Total (48 items)	HPS-48	.85	18.07	7.83	2-40	.34	.222	
HPS Total (20 items)	HPS-20	.82	7.63	4.46	0-20	.42	.947	
Three-Factor Solutiona								
Social Vitality	Vitality	.74	7.40	4.02	0-20	.22	**.006**	.29
Mood Volatility	Volatility	.80	6.09	3.69	0-15	.33	.607	
Excitement	Excitability	.78	2.58	2.32	0-8	.66	.078	
Four-Factor Solutionb								
Affective Moodiness	Moody	.81	6.90	4.10	0-16	.47	.471	
Cognitive Component	Cognitive	.56	6.77	2.67	1-14	.10	.119	
Hypersociability	Sociable	.67	2.41	1.92	0-8	.52	.152	
Perceived Ordinariness	Ordinary	.52	0.94	0.97	0-4	.82	< **.001**	.41
Five-Factor Solutionc								
Activation	Activation	.82	3.16	2.73	0-9	.65	.128	
Charisma	Charisma	.67	3.20	2.30	0-10	.37	**.015**	.25
Intellectual Confidence	Intellect	.53	4.07	1.88	0-8	.05	**.028**	.24
Lability	Lability	.56	3.61	1.97	0-8	.35	.961	
Modesty	Modesty	.63	1.18	1.34	0-5	1.08	**.011**	.28
	MTurk Sample (*N* = 324)							
HPS Total (48 items)	HPS-48	.88	16.44	8.54	0-39	.35	**.003**	.33
HPS Total (20-items)	HPS-20	.84	6.75	4.64	0-19	.41	**.004**	.32
Three-Factor Solutiona								
Social Vitality	Vitality	.78	6.64	4.26	0-17	.25	**.006**	.30
Mood Volatility	Volatility	.78	5.60	3.89	0-14	.29	**.017**	.27
Excitement	Excitability	.80	2.16	2.27	0-8	.87	**.006**	.31
Four-Factor Solutionb								
Affective Moodiness	Moody	.84	6.19	4.26	0-17	.57	**.027**	.25
Cognitive Component	Cognitive	.62	6.28	2.84	1-13	.22	**.048**	.22
Hypersociability	Sociable	.52	1.99	1.89	0-8	.76	**.001**	.36
Perceived Ordinariness	Ordinary	.47	0.97	1.01	0-4	.90	**.004**	.32
Five-Factor Solutionc								
Activation	Activation	.85	2.54	2.69	0-9	.85	**.009**	.29
Charisma	Charisma	.74	2.73	2.41	0-9	.59	**.005**	.31
Intellectual Confidence	Intellect	.62	3.69	2.04	0-8	.24	**.023**	.25
Lability	Lability	.63	3.47	2.09	0-9	.42	.521	
Modesty	Modesty	.59	1.17	1.30	0-5	1.02	**.039**	.23

Note: Men scored higher than women on all indices where significant differences were found. Factor scores were derived from three different structural models ([a] Schalet et al., 2011; Rawlings et al., 2000; & [c] Stanton et al., 2017).

Table 2
Descriptive Statistics for the Aggression Criterion Indicators

Aggression Criterion Indicators	Label	*M*	*SD*	Range	Skew	Gender Effect	
						p	*d*
	College Sample (*N* = 408)						
Buss-Perry Aggression Total	BPAQ	58.80	17.86	29-129	.74	**.001**	.37
LAVA Indicators							
Motivated Acts of Aggression	MAGG	1.18	1.62	0-5	1.26	**.002**	.37
Injury to Other	ITO	.64	2.09	0-17	4.74	**.007**	.37
Trouble Due to Violence	TVA	.22	.76	0-6	4.45	**.008**	.35
Reactive Acts	React	.93	1.66	0-15	3.24	**.012**	.33
IPV Acts	IPV	.50	1.17	0-9	3.72	.885	
Alcohol-Related Acts	Alcohol	.26	.89	0-9	4.73	.739	
Lethal Risk Acts	Lethal	.10	.49	0-3	5.37	.323	
	MTurk Sample (*N* = 324)						
Buss-Perry Aggression Total	BPAQ	67.00	21.21	29-137	.40	< **.001**	.47
LAVA Indicators							
Motivated Acts of Aggression	MAGG	1.43	1.68	0-5	1.01	< **.001**	.57
Injury to Other	ITO	2.02	3.99	0-26	2.62	< **.001**	.60
Trouble Due to Violent Acts	TVA	.64	1.33	0-6	2.57	< **.001**	.52
Reactive Acts	React	1.25	1.78	0-11	2.08	< **.001**	.43
IPV Acts	IPV	.63	1.21	0-7	2.23	.105	
Alcohol-Related Acts	Alcohol	.52	1.23	0-10	3.11	< **.001**	.47
Lethal Risk Acts	Lethal	.31	.90	0-4	2.68	< **.001**	.46

Note: Men higher than women on all indices where significant differences were found.

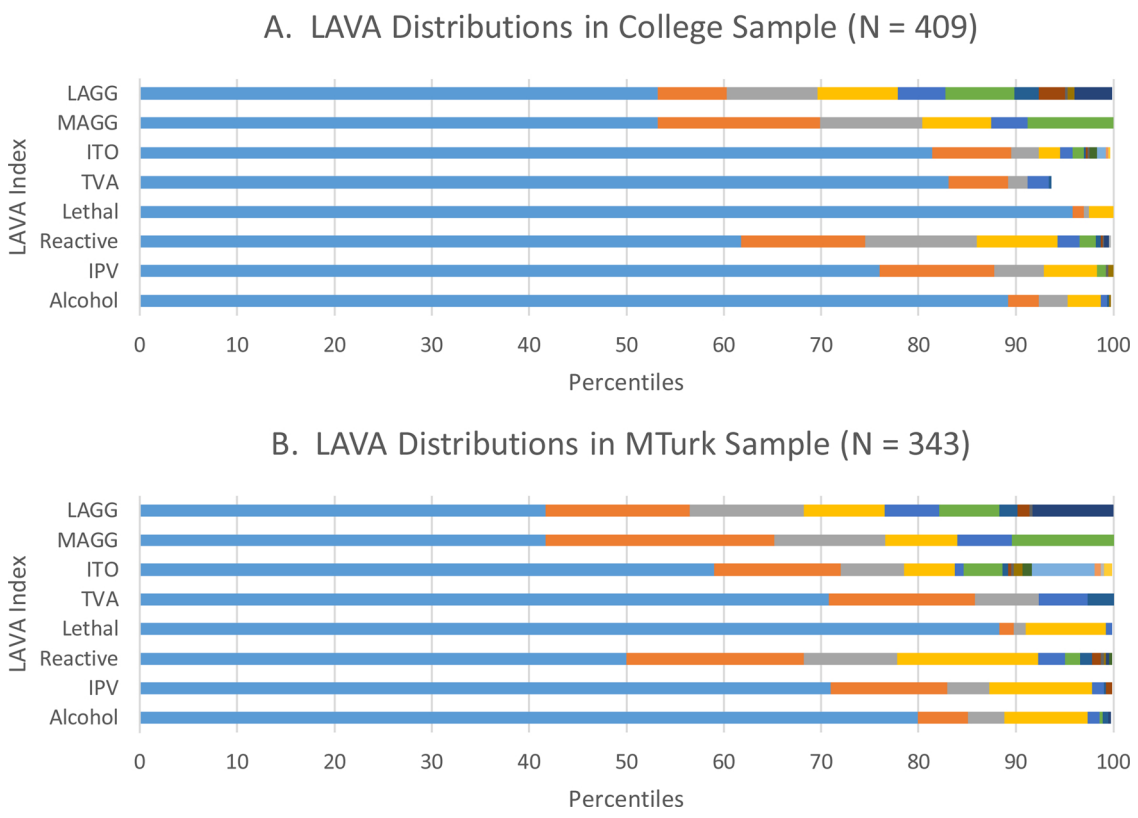

Fig. 1. LAVA Index Distributions within the College and MTurk Samples.
Note: LAGG = Lifetime Aggressive Acts; MAGG = Motivated Acts; ITO = Injury to Other; TVA = Trouble from Violent Acts; Lethal = Lethal Acts; Reactive = Reactive Acts; IPV = Intimate Partner Acts; Alcohol = Alcohol-Related Acts. Color changes for each indicator indicates the score incrementation from 0 (blue bar) to 10 (or greater).

The LAVA indicators varied widely in these two samples (Table 2 & Fig. 1). Men scored higher than women on many of the hypomania (d ~ .30) and aggression (d ~ .45) indicators. Acts of lifetime aggression were reported by sizable subsets of men and women in both samples. Prior aggressive acts culminated in at least one injury to another for substantial subsets of the college (n = 76, 18.6%) and MTurk (n = 133, 41.0%) samples. The injuries inflicted within this subset (ITO > 0) were consequential: “broken bones” (5.9%), “head or facial injury (4.5%), “deep cuts” (3.2%), “loss of consciousness” (4.5%), “brain injuries” (3.6%), and other maladies. Ambulance (3.2%) and/or emergency hospitalization (4.1%) was sometimes required. Physical threat, verbal harassment, and challenges to pride were the most common triggers for violent acts, with only a small number of respondents identifying athletic competition as the trigger for injuring another.

3.2. Bivariate Partial Correlation Analyses

Table 3 illustrates the pattern of associations between the HPS and aggression indicators in the two samples. Respondent age was controlled in all calculations. Gender differences in relationship strength were shaded (men stronger for all but trait aggression and Intellectual Confidence). The weaker coefficient still breached the Bonferroni threshold in five of these correlates which included MAGG and Affective Moodiness (r = .46 vs .25, p < .001), Lethal and Hypersociability (r = .41 vs .22, p < .001), and ITO and Charisma (r = .42 vs .25, p < .001), Excitement (r = .47 vs .30, p < .001), and Activation (r = .47 vs .30, p < .001). HPS Total scores (both long and short versions) were more strongly associated with all of the aggression indicators in the MTurk versus college sample. Total HPS correlates with BPAQ physical aggression (r = .32, p < .001), verbal aggression (r = .27, p < .001), trait anger (r = .33, p < .001), and trait hostility (r = .28, p < .001) in the MTurk sample did not differ significantly in strength.

3.3. Factor Score and Aggression Indicator Intercorrelations

Table 4 (top panel) presents the intercorrelations between the 12 factor scores generated from these three different statistical models. Factor scores within models, and the aggression indicators, showed relative independence from one another. A subset of factors from these three models measured similar content domains: A) Mood Volatility (three-factor), Affective Moodiness (four-factor), & Lability (five-factor); B) Excitement (three-factor) & Activation (five-factor); C) Social Vitality (three-factor), Hypersociability (four-factor) and Charisma (five-factor); D) Cognitive Component (four-factor) and Intellectual Confidence (five-factor); and E) Perceived Ordinariness (four-factor) and Modesty (five-factor).

3.4. Regression Analyses

Linear regression analyses were used to identify the individual factors within each of the three different statistical models that accounted for unshared variance in the aggression indicators. The standardized beta coefficients for these 21 three (model) by seven (dependent measure) regression analyses are summarized in Table 5. The adjusted R^2 and significance level for each model is indicated in the shaded area. Trait aggression was most closely associated with mood instability across the models for both the men and women. Conversely,

Table 3
Partial Bivariate Correlations of HYP Scores with the Aggression Indictors Total Sample

HPS Predictor Indices	BPAQ	MAGG	ITO	TVA	React	IPV	Alcohol	Lethal
	College Sample (*N* = 408)							
HPS Total (48 items)	.17**	.16**	.17**	.12*	.15**	.06	.19**	.14*
HPS Total (20 items)	.19***	.18**	.16**	.10	.18**	.12*	.19**	.15**
Three-Factor Model a								
Social Vitality	.04	.13*	.15**	.11	.11	.01	.16**	.10
Mood Volatility	.26***	.18**	.15**	.11	.17**	.13*	.15**	.15**
Excitement	.12*	.07	.10	.06	.10	.04	.15**	.11*
Four-Factor Model b								
Affective Moodiness	.23***	.20***	.13*	.08	.14*	.09	.16**	.13*
Cognitive Component	.09	.13*	.17**	.13*	.12*	.05	.12	.09
Hypersociability	.05	.08	.09	.10	.10	.01	.17**	.10
Perceived Ordinariness	.00	.02	.05	.02	.02	-.07	.08	.04
Five-Factor Model c								
Activation	.11	.06	.11	.06	.10	.03	.13*	.10
Charisma	.04	.17**	.16**	.13*	.15*	.06	.17**	.08
Intellectual Confidence	.14*	.11*	.20**	.15*	.12*	.05	.04	.07
Lability	.30***	.18***	.09	.08	.11*	.12*	.13*	.12*
Modesty	-.03	-.02	-.07	.02	-.07	-.12*	.04	.03
	MTurk Sample (*N* = 324)							
HPS Total (48 items)	.36***	.35***	.38***	.41***	.32***	.29***	.32***	.34***
HPS Total (20-items)	.40***	.36***	.36***	.40***	.34***	.30***	.31***	.34***
Three-Factor Model a								
Social Vitality	.18***	.23***	.32***	.31***	.18**	.21**	.27***	.30***
Mood Volatility	.45***	.37***	.29***	.35***	.37***	.26***	.28***	.25***
Excitement	.34***	.32***	.43***	.42***	.30***	.31***	.29***	.40***
Four-Factor Model b								
Affective Moodiness	.45***	.37***	.36***	.40***	.38***	.29***	.28***	.32***
Cognitive Component	.19**	.18**	.19**	.25***	.18**	.16**	.18**	.16**
Hypersociability	.16**	.25***	.40***	.35***	.22***	.25***	.35***	.36***
Perceived Ordinariness	.10	.23***	.22***	.20**	.13*	.18**	.22***	.21***
Five-Factor Model c								
Activation	.34***	.33***	.42***	.43***	.33***	.31***	.29***	.38***
Charisma	.20**	.23***	.36***	.32***	.21**	.25***	.31***	.35***
Intellectual Confidence	.21**	.20**	.14*	.19**	.20**	.14*	.15*	.09
Lability	.42**	.30***	.22**	.27***	.32***	.21***	.21***	.18**
Modesty	-.04	.11	.11	.11	-.01	.09	.03	.13*

Note: Age partialled for all calculations. BPAQ = Trait Physical Aggression; MAGG = Motivated Acts of Aggression; ITO = Injury to Other; TVA = Trouble from Violent Acts; React = Reactive Acts of Aggression; IPV = Intimate Partner Acts; Alcohol = Alcohol-Related Acts; Lethal = Lethal Acts. *$p < .05$. **$p < .01$. ***$p < .001$. Shaded block indicate gender difference in strength.

lethal threats and injuries inflicted on other(s) occurred more frequently among men exhibiting the factor attributes of social vitality, hypersociability, charisma, and excitement.

3.5. Analyses of Covariance

Researchers have examined different thresholds to estimate the risks posed particularly high HPS scores. This study defined "high risk" by HPS scores that exceeded +1 standard deviation from our mean (= > 25) in the MTurk distribution (top 20%). These "high risk" respondents ($n = 65$) were contrasted with those scoring below 25 ($n = 259$) in the MTurk sample in a series of 2 (HPS risk group) x 2 (gender) Analyses of Covariance with respondent age covaried. Significant HPS group effects were found for all of the aggression indicators: BPAQ, F (1, 278) = 13.59, $p < .001$ ($d = .44$), MAGG, F (1, 316) = 20.25, $p < .001$ ($d = .51$), ITO, F (1, 316) = 45.54, $p < .001$ ($d = .76$), TVA, F (1, 316) = 18.22, $p < .001$ ($d = .50$), IPV, F (1, 316) = 27.99, $p < .001$ ($d = .59$), React, F (1, 316) = 8.25, $p = .004$ ($d = .32$), Alcohol, F (1, 316) = 22.97, $p < .001$ ($d = .54$), and Lethal, F (1, 316) = 35.44, $p < .001$ ($d = .67$). The gender effects were significant for all but the BPAQ variable ($p = .138$). Age was not significant as a covariate in any analysis. The gender by risk group interaction was significant for only ITO, F (1, 316) = 11.28, $p = .001$ ($d = .38$), and Lethal Acts, F (1, 316) = 13.92, $p = .001$ ($d = .42$). These interactions were manifested in strong HPS high risk group effects for both the women (ITO, $d = .52$; Lethal, $d = .31$) and men (ITO, $d = .96$; Lethal, $d = .95$) with a steeper slope found for the latter cohort.

3.6. Odds Ratios (Binary Logistic Regressions)

The normative score for all of the LAVA indices was 0 (see Fig. 1), and any elevation (> 0) on a LAVA index reflected one or more past acts of physical aggression within that domain. An HPS score of 25 or higher increased the odds of reporting one or more past incidents of each of the following aggressive acts: MAGG, Wald (1) = 10.93, $p = .001$, $OR = 2.88$; TVA, Wald (1) = 29.48, $p < .001$, $OR = 5.21$; Reactive, Wald (1) = 13.29, $p < .001$, $OR = 2.99$, $RR = 2.96$; IPV, Wald (1) = 15.30, $p < .001$, $OR = 3.08$; and Alcohol, Wald (1) = 24.28, $p < .001$, $OR = 4.54$. Odds ratios were differentiated by gender for ITO [Men: Wald (1) = 9.97, $p = .002$, $OR = 4.04$; Women: Wald (1) = 2.96, $p = .086$, $OR = 2.08$] and Lethal [Men: Wald (1) = 17.81, $p < .001$, $OR = 6.47$; Women: Wald (1) = 5.81, $p = .016$, $OR = 5.96$] scores. This high risk HPS cohort was disproportionately represented by men (56.9%), $\chi^2(1) = 3.91$, $p = .048$, and ethnic respondents, $\chi^2(5) = 21.53$, $p = .001$. The two cohorts did not vary by age ($p = .074$).

4. Discussion

Data generated from these two samples may be relevant to the hypomania literature in a number of areas:

Table 4
HPS Factor Score (top) and Aggression Indicator (bottom) Intercorrelations

Factor Score	Code	A	B	C	D	E	F	G	H	I	J	K	L
Three-Factor Model a													
Social Vitality	A	X	.41	.49	.42	.76	.77	.62	.48	.88	.56	.25	.49
Mood Volatility	B	.53	X	.65	.92	.59	.41	.10	.73	.42	.63	.84	-.07
Excitement	C	.62	.70	X	.83	.52	.63	.14	.95	.52	.48	.50	.00
Four-Factor Model b													
Affective Moodiness	D	.57	.93	.86	X	.52	.46	.10	.87	.44	.55	.83	-.06
Cognitive Component	E	.81	.65	.53	.57	X	.51	.29	.55	.63	.87	.33	.20
Hypersociability	F	.78	.43	.69	.51	.52	X	.40	.58	.87	.36	.28	.24
Perceived Ordinariness	G	.63	.29	.36	.32	.35	.48	X.	.09	.42	.12	.42	.80
Five-Factor Model c													
Activation	H	.63	.76	.96	.88	.59	.66	.32	X	.51	.55	.49	-.07
Charisma	I	.88	.46	.63	.53	.65	.89	.47	.62	X	.45	.26	.20
Intellectual Confidence	J	.64	.67	.45	.55	.90	.37	.22	.53	.47	X	.36	-.06
Lability	K	.35	.85	.58	.86	.38	.32	.22	.57	.32	.38	X	.02
Modesty	L	.54	.12	.21	.15	.26	.31	.82	.16	.29	.08	.11	X

Aggression Indicator		AA	BB	CC	DD	EE	FF	GG	HH	II	JJ	KK
BPAQ-PA	AA	X	.47	.61	.46	.39	.27	.40	.39	.16	.16	.05
BPAQ-VA	BB	.58	X	.57	.49	.24	.10	.22	.16	.11	.05	.04
BPAQ-A	CC	.65	.69	X	.59	.24	.10	.27	.14	.12	.10	.00
BPAQ-H	DD	.54	.56	.62	X	.25	.06	.14	.20	.16	.02	.00
MAGG	EE	.60	.30	.41	.34	X	.41	.25	.71	.56	.42	.26
ITO	FF	.43	.25	.36	.24	.61	X	.20	.50	.25	.34	.54
TVA	GG	.40	.18	.30	.21	.50	.59	X	.20	.03	.25	.03
React	HH	.48	.26	.31	.29	.74	.49	.38	X	.43	.30	.25
IPV	II	.24	.11	.27	.16	.54	.61	.43	.39	X	.56	.33
Alcohol	JJ	.35	.15	.28	.20	.58	.66	.40	.45	.59	X	.50
Lethal	KK	.30	.16	.27	.17	.48	.82	.48	.39	.64	.69	X

Note: College sample (N = 408) above vertical. MTurk sample (N = 324) below vertical.

4.1. Hypomanic Attributes and Lifetime Aggression

Associations between HPS total scores and the criterion indicators were strong (medium to large effect sizes) and pervasive within the MTurk sample. BPAQ and MAGG scores were associated with selected HPS factor scores (Mood Volatility, Affective Moodiness, & Lability) among the college students as well. These associations were consistent with prior work showing relationships between hypomania and irritability (Dolenc et al., 2015; Hantouche & Perugi, 2012; Meter et al., 2016; Savitz et al., 2008). BPAQ trait aggression associations were not, however, significantly stronger that those found for the LAVA indicators. This pattern of results may suggest that the "irritability" criterion in the DSM-5 bipolar spectrum criteria extends to higher rates of physical fighting as well. While the value of high score thresholds to predict diagnostic risk represents a decided plus for the HPS index, studies illustrating dimensional links between HPS scores and non-diagnostic criteria provide supplemental evidence regarding about the hazards of even subclinical hypomania.

4.2. Relative Risk Posed by an Elevated HPS Score

Eckblad and Chapman (1986) relied on an especially high threshold (> 35) to establish an elevated risk of bipolar disorder. The samples in this study generated HPS means and standard deviations that were comparable to those found in other recent distributions (Meads & Bentall, 2008; Rawlings et al., 2000; Schalet et al., 2011). Schalet and colleagues commented that their mean was a half standard deviation lower than the one reported for the normative HPS distribution (Eckblad & Chapman, 1986). The ranges of HPS scores in our samples extended to40 but only 1% exceeded a score 35. While a threshold this high might be required as a HPS diagnostic risk indicator, lower cutoffs warrant consideration for interpreting broader risks posed by an HPS "elevation". It also has been common to see group contrasts between respondents with markedly high versus low HPS scores (Kwapil et al., 2000; Walsh et al., 2015). This approach relies on a comparison group that is unusually low in its hypomanic attributes. The present study instead identified a threshold (= > 25) that represented an aggression risk that classified 20% of our MTurk sample. Potential risks associated with this threshold then applied to the entire remaining sample, not just an extreme subset at the bottom of the distribution. For example, the odds of reporting prior lethal threats and/or injuries to other(s) were found to be three to five times higher for MTurk respondents with an HPS score above 25. These odds derived from a lower HPS risk threshold than examined previously were substantial in size.

4.3. Gender Differences in HPS Association Strengths

Men scored higher than women on all of the aggression indicators which was consistent with prior research (King, Breen et al., 2017; King, Ballantyne et al., 2017, 2018; King, Russell et al., 2017; Matson et al., 2018). Evidence regarding gender differences in HPS associations with the aggression indicators was mixed. While HPS-20 and MAGG scores were more strongly correlated for the men, no other gender differences were found between total HPS scores and the eight criterion measures in either sample. HPS factor scores among the men were significantly stronger than the women in 18.7% of the Table 4 contrasts. These gender differences were distributed disproportionately within the four-factor model (Rawlings et al., 2000). Gender by HPS risk group interactions were found for only ITO and Lethal scores, with both men and women showing significant effects. The effect sizes of the differences between high (= > 25) and normative (remaining sample) ITO (d = .96) and Lethal (d = .95) scores were especially noteworthy.

4.4. HPS Factor Score Aggression Correlates

There was considerable redundancy in the factor dimensions derived from the three different models examined in this study (see Table 5). These overlapping factor dimensions were summarized previously and were generally consistent with a more comprehensive earlier analysis of these same three models (Stanton et al., 2017). Three

Table 5
Standardized Beta Coefficients Derived From Independent Regressions for Three HPS Models

HPS Factor Scores	BPAQ	MAGG	ITO	React	IPV	Alcohol	Lethal
	Men (n = 146)						
Three-Factor Model a	.10**	.17***	.28***	.38***	.17***	.12***	.22***
Social Vitality	-.18	.07	**.26****	.03	.12	.24*	.17
Mood Volatility	**.27****	**.21****	-.15	.23*	.02	04	-.16
Excitement	.20	**.24***	**.46*****	.19	**.34*****	.17	**.48*****
Respondent Age	-.03	.09	.10	.09	.02	13	.05
Four-Factor Model b	.11**	.18***	.24***	.14***	.16***	.15***	.17***
Affective Moodiness	**.46*****	**.38*****	.18	**.40*****	**.23***	.08	.19
Cognitive Component	-.14	-.07	-.03	-.07	-.05	.03	-.04
Hypersociability	-.05	.12	**.41*****	.13	**.28****	**.33****	**.35*****
Perceived Ordinariness	-.30	.08	.01	-.05	.01	.07	-.02
Respondent Age	-.06	.05	.06	.05	-.02	.09	.01
Five-Factor Model c	.11**	.16***	.29***	.13***	.17***	.12***	.25***
Activation	.22	**.29***	**.43*****	**.25***	**.37****	.20	**.45*****
Charisma	-.09	.08	**.31****	.10	.17	**.24***	**.24***
Intellectual Confidence	-.10	.01	-.12	-.02	-.06	.00	-.16
Lability	**.29****	.14	-.12	.16	-.04	-.01	-.14
Modesty	-.06	.04	.07	-.08	.04	.09	.07
Respondent Age	-.06	.07	.09	.06	.00	.11	.03
	Women (n = 175)						
Three-Factor Model a	.29***	.08**	.09**	.08**	.03*	.04*	.08**
Social Vitality	-.05	.04	-.01	-.08	.03	.09	.09
Mood Volatility	**.53*****	**.31****	.14	**.30****	.16	.12	-.05
Excitement	.04	-.08	.19	.05	.07	.07	**.27***
Respondent Age	-.04	-.08	-.08	-.05	-.02	-.03	-.06
Four-Factor Model b	.28***	.05*	.09**	.06**	.03	.04*	.07**
Affective Moodiness	**.57*****	.19	**.21***	**.24***	.15	.14	.12
Cognitive Component	.01	.05	-.04	.07	.05	-.03	.05
Hypersociability	-.12	-.02	.20*	.00	.03	.19	**.27****
Perceived Ordinariness	.00	.07	-.04	-.07	.07	-.03	-.01
Respondent Age	-.07	-.10	-.07	-.07	-.02	-.02	-.03
Five-Factor Model c	.28***	.05*	.11***	.08**	.03	.06*	.09**
Activation	.05	.05	.19	.08	.05	.06	.15
Charisma	.12	.04	.18	.03	.10	**.23***	**.25****
Intellectual Confidence	.07	.10	-.04	.11	.08	-.07	-.09
Lability	**.41*****	.12	.06	.15	.08	.11	.03
Modesty	-.14*	-.03	**-.16***	-.14	-.03	-.05	-.07
Respondent Age	-.07	-.10	-.11	-.07	-.03	-.04	-.07

Note: Model adjusted R^2 and significance levels are shaded. * p < .05. ** p < .01. *** p < .001.

clusters (Mood Volatility/Affective Moodiness/Lability; Social Vitality/Hypersociability/Charisma; and Excitement/Activation) were of most relevance in this study. Trait aggression and the frequency of past aggressive acts (MAGG) were best predicted by emotional volatility (Mood Volatility/Affective Moodiness/Lability), with standardized beta weights as high as .57 and .46 for the women and men respectively. ITO and Lethal scores, however, were highest among men exhibiting high positive energy (Excitement & Activation) and/or social engagement needs (Social Vitality/Hypersociability/Charisma). The social attributes were described by their respective factor analysts as gregariouisness, social confidence, social engagement, attention neediness, and assumed leadership ability. Energetic men with inflated social confidence may have posed the highest risk of these most consequential transgressions. The emotional valence of many aggressors may prove to be decidedly positive at the outset of interactions that are destined to turn sour. This possibility appears consistent with prior research demonstrating risks associated with extreme positive emotionality during goal pursuit (Johnson et al., 2013; Sutton & Johnson, 2002; Trevisani et al., 2008).

4.5. HPS Factor Structure Comparisons

HPS factor structures are likely to vary by sample composition, and this study relied on factor structures observed in college (Schalet et al., 2011), general public (Stanton et al., 2017), and hybrid student/public (Rawlings et al., 2000) samples. The five-factor model (Stanton et al., 2017) was distinguished by its reliance on a sample of community adults with mental health diagnostic and treatment histories. Despite sample and factor dimension differences, these three models seemed functionally equivalent in their ability to account for variance in the aggression indicators examined in this study.

4.6. HPS-20 Aggression Correlates

The HPS-20 (Meads & Bentall, 2008) continues to facilitate research on the affective disorders as a brief hypomania screening measure. The HPS-20 was derived from the same item content and the two measures are highly correlated. The aggression correlates established in this study extend the criterion validity of the newer and shorter version of the HPS.

4.7. Limitations

The cross-sectional survey methodology relied upon in this study precluded meaningful nferences regarding the directionality of the identified associations. All of these data were self-report and retrospective in nature which did not allow for verification of the accuracy of any respondent recollection. Interpretive caution is warranted as well in regard to the significance of particular disclosures. The practical importance of an acknowledged “threat to kill someone” would vary widely by respondent and incident. Similarly, an elevated ITO score could reflect a single inconsequential incident, or even a justifiable act of self-defense. Alcohol intoxication was cited as an extenuating factor for 11% and 20% of the college and MTurk respondents. Notwithstanding, measures of addiction and other factors that might modulate the expression of aggression by (hypo)manic individuals were not examined or controlled in this study. Results from these samples

may not generalize well to clinical or other more specialized populations that differ substantially in their composition.

Ethics

This project was approved by our IRB, and all ethical standards were followed in the course of the study including documentation of informed consent prior to participation. The APA Publication Manual (6th Edition) was followed in the preparation of this manuscript which is 8,676 words in length which includes 5 tables and 1 figure. This manuscript has not be posted online or in any other forum.

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Author Statement

ARK designed the study, secured IRB approval and collected the college sample data, and conducted the analysis. AM secured IRB approval and collected the national sample data.

ARK drafted the manuscript with contributions from TWK, JW, and MCE. All authors approved the final draft of the manuscript.

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