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The clashing nature of rebelliousness: Nontraditional attitudes and counter-normative behaviors show divergent associations with intelligence

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Abstract

Intro: Prior literature indicates that nontraditional attitudes are linked to higher intelligence. However, such attitudes in adolescence often accompany counter-normative, delinquent-type behaviors, which are themselves negatively linked with intelligence. This points to the possibility of suppression in the relationship between intelligence and nontraditional attitudes.

Methods: We analyzed a large community sample of 17-year-olds (N = 3330) with data on intelligence, nontraditional attitudes, and a diverse collection of self- and teacher-reported counter-normative behaviors. Developmental questions for these relationships were examined through cross-sectional comparisons between the adolescents and their parents as well as longitudinal analysis of the adolescent sample across emerging adulthood.

Results: Youth who endorsed nontraditional attitudes had lower school grades, earlier age at first sex, heavier substance use, and were perceived as more oppositional by their teachers. Each of these problem behaviors was inversely related to intelligence. Accordingly, the positive correlation between nontraditional attitudes and intelligence was much weaker in adolescents as
compared to their middle-aged parents. Longitudinal analyses revealed that the association between nontraditional attitudes and intelligence strengthens in early adulthood.

**Conclusion:** Associations between intelligence and sociopolitical attitudes can be obscured even by seemingly distal psychological characteristics.

**Keywords:** sociopolitical attitudes, traditionalism, adolescence, intelligence, delinquency

The clashing nature of rebelliousness: Nontraditional attitudes and counter-normative behaviors show divergent associations with intelligence

The present study explores the intersection of three well-studied psychological features: nontraditional attitudes, counter-normative behaviors, and intelligence. Nuanced disputes concerning the particular labels and measurements for these dimensions are ongoing and addressed below, but the relationships between each pair of these three features appear robust to such issues. Nontraditional attitudes correlate positively with intelligence (Onraet et al., 2015) and positively with counter-normative behaviors (Kannan & Veazie, 2018; Wright, Beaver, Morgan, & Connolly, 2017), even while these latter two characteristics are negatively correlated (Lynam, Moffitt, & Stouthamer-Lorber, 1993). Little prior work has recognized this peculiar three-way intersection of relationships, nor evaluated the implied statistical suppression this provides for relationships between individual constructs. The present study uses a large longitudinal study of adolescents \((N \geq 3,330)\) as well as a parent sample to explore the intersection between these traits and how it changes through development.

**Sociopolitical attitudes and counter-normative behaviors**

**Nontraditional Attitudes**

The attitude measure used in the present study is the Traditionalism scale from the Multidimensional Personality Questionnaire (MPQ; Tellegen & Waller, 2008). For ease of discussing the relationships with the other constructs studied here, we refer to the reverse-scored version of this, as “nontraditional attitudes.” Importantly, this construct and the measure we employ for it are deeply connected to a range of more familiar constructs and measures. These measures represent attitudes towards change in contemporary social structures. In this dimension of attitudes, advocacy for the preservation of and adherence to previous social norms (variously labelled authoritarianism, social conservatism, conventionalism, or traditionalism) is
contrasted with a preference for social change (variously labelled non-authoritarianism or unconventional/nontraditional attitudes).

Measuring this domain is not without challenges, with putative individual assessments of the area often including seemingly unrelated content. A dominant perspective (Jost, Glaser, Kruglanski, & Sulloway, 2003) characterizes both the Wilson-Patterson Conservativism scale (Wilson and Patterson, 1968) and Altemeyer’s (1981) Authoritarianism measure as assessments of attitudes towards change, as distinguished from the other major psychological dimension posited to underlie sociopolitical differences, namely, attitudes towards equality. However, items from Conservatism can also be used to measure attitudes towards equality (cf. Ksiazkiewicz et al., 2020), and Authoritarianism stretches beyond a mere preference for stability into an eagerness to physically punish those who threaten it (Altemeyer, 1996).

Despite some apparent divergences in the content of these measures, the extremely tight empirical linkages between them support treating them as representations of a common core construct. Behavior genetic analyses showed Traditionalism to have strong links with the common factor representing conservatism, authoritarianism, and religiousness, with a phenotypic correlation of .75 and a near-perfect overlap between the underlying genetic contributors (.91: Ludeke, Johnson, & Bouchard, 2013). Within the attitudinal space, these are exceptionally tight linkages; for example, analyses of the most prominent measure of attitudes towards equality (Social Dominance Orientation) found its two facets correlated only $r \leq .42$, with genetic contributions correlating only .48 (Kleppestø et al., 2019).

Other research on several large community samples reported Traditionalism attaining a mean correlation of .73 with Altemeyer’s authoritarianism construct (Ludeke, 2016). That correlation, obtained using scale scores and employing no correction for measurement error, are highly comparable to results obtained when correlating two different measures of the same trait (e.g., Extraversion as measured by John’s Big Five Inventory and Costa and McCrae’s NEO instruments: Soto & John, 2017). As both Traditionalism and Altemeyer’s Right-wing Authoritarianism (RWA) scale derive substantially from Adorno and colleague’s F Scale (Adorno, Frenkel-Brunswik, Levinson, & Sanford, 1950), this is perhaps to be expected.

**Associations with Counter-Normative Behaviors**

Studies employing sociopolitical attitude measures typically focus on the behaviors and beliefs most closely connected to the sociopolitical sphere. However, the potential nomological
network for sociopolitical beliefs is certainly much broader. Of particular interest for the present work are counter-normative behaviors such as smoking, binge drinking, and delinquent school-related behaviors. Cognitive dissonance theory (Festinger, 1957) points to the likelihood that those violating social norms will likely subscribe to sociopolitical views that emphasize personal autonomy and the diminishment of social control, somewhat akin to how those engaging in negative health behaviors will perceive the risks and deviance of such behaviors as relatively low.

Although prior research rarely explicitly examines this prospect, existing evidence is clearly supportive. Consumption of alcohol and tobacco is higher on the political left (Kannan & Veazie, 2018), as are self-reported criminal behaviors (Wright et al., 2017). Youth who endorse low levels of RWA are prone to disobey laws and engage in delinquent-type behaviors (Oosterhoff, Shook, Clay, & Metzger, 2017). Those endorsing nontraditional attitudes have more substance use problems and higher levels of delinquency, documented not only with self-report but even with court records (Elkins, King, McGue, & Iacono, 2006; Krueger et al., 1994; Krueger et al., 1996; Vrieze, Vaidyanathan, Hicks, Iacono, & McGue, 2014). That counter-normative behaviors connect to nontraditional attitudes should not be surprising – measures of such attitudes often even include questions about how one feels about such counter-normative behaviors and societal efforts to suppress them.¹

**Intersection with Intelligence**

Considerations of a role for intelligence adds additional interest to the intersection between these two domains. Although often omitted from psychological accounts of sociopolitical attitude differences (Hodson, 2014), intelligence remains a non-trivial predictor of such attitudes (Onraet et al., 2015). This is especially true when one compares intelligence against other behaviorally assessed characteristics (Ludeke, Tagar, & DeYoung, 2016; Van Hiel, Onraet, & De Pauw, 2010). Various mechanisms have been proposed to explain the positive association between intelligence and socially liberal, nontraditional attitudes. According to an influential theory, conservative ideology accompanies a rigid worldview and an intolerance for ambiguity (Adorno et al., 1950; Duncan & Peterson, 2014). Attitudes towards complex social

¹ For example, Altemeyer’s (1996) RWA items included “The facts on crime, sexual immorality, and public disorders all show we have to crack down harder on deviant groups and troublemakers if we are going to save our moral standards and preserve law and order,” and Duckitt et al.’s (2010) revision to RWA includes “This country will flourish if young people stop experimenting with drugs, alcohol, and sex, and pay more attention to family values.”

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issues are thus reduced to an absolutist “right vs. wrong” approach. As a result, dogmatic thinking may appeal to individuals who have less sophisticated reasoning skills. Individuals of greater intellectual ability, by contrast, are claimed to better appreciate the merits of diverse, mutually clashing positions, leading to the development of cultural and moral relativism (i.e., nontraditional beliefs).

The inverse relationship between intelligence and counter-normative behaviors—particularly in the form of adolescent delinquency—is even more well-established (Lynam, Moffitt, & Stouthamer-Lorber, 1993). Low IQ is a robust correlate of antisocial behavior, based on both public records and self-reports of delinquency (Moffitt & Silva, 1988). Juvenile offenders, even more so than adult offenders, are characterized by low intelligence, particularly in the verbal domain (Isen, 2010). Furthermore, minors who are sexually active and use prohibited substances perform less well in school and on intelligence tests (Halpern, Joyner, Udry, & Suchindran, 2000; Miller & Sneesby, 1988; Jackson et al., 2016; Sjölund, Hemmingsson, & Allebeck, 2015). This association is likely mediated by family-wide environmental influences that transcend socioeconomic and ethnic boundaries (Harden & Mendle, 2011; Jackson et al., 2016).

This pattern of relationships—nontraditional attitudes positively linked with both intelligence and counter-normative behaviors, while the latter two domains are negatively associated—highlights the likelihood that the association between nontraditional attitudes and intelligence is suppressed when counter-normative behaviors are left unconsidered. Because existing research in these domains rarely if ever simultaneously incorporates all three areas, such suppression would not be immediately evident.

Importantly, any such suppression may not be equally relevant throughout the life course. Intelligence most effectively predicts counter-normative behaviors (such as substance use/abuse and antisocial conduct) among adolescents rather than adults (Isen, 2010; Johnson et al., 2010). Accordingly, any suppression of the link between intelligence and nontraditional attitudes may be particularly acute among adolescents.

Strictly testing such a proposition is distinctively challenging, and we do not attempt to do so here. Many of the most common counter-normative behaviors in adolescence (e.g., consuming substances prohibited for minors, classroom misbehavior) are behaviors that adults either cannot perform or which would likely have different psychological roots for adults.
Because norms for behaviors vary based on the age of the actor (Jessor, 2017), measuring counter-normative behaviors in a meaningfully age-invariant fashion is not obviously possible. However, indirect evidence of more acute adolescent suppression might nevertheless be sought by comparing the magnitude of the association between intelligence and nontraditional attitudes across ages.

**Present Study**

We use a large sample of twins (assessed at ages 17 and 24) as well as their parents to address a series of questions. First, we explore the correlations between intelligence, nontraditional attitudes, and a diverse suite of counter-normative behaviors, including alcohol and nicotine use, teacher-ratings of oppositional behavior, poor grades, and early sexual activity. Second, we test for evidence of the hypothesized statistical suppression, exploring how the link between intelligence and nontraditional attitudes may be suppressed by their respective associations with counter-normative behaviors. We anticipate the presence of cooperative suppression, which occurs when two correlated predictors “evince opposing relations with a given criterion, such that inclusion of both concurrently in a regression model increases the predictive weight of each with the criterion” (Blonigen et al., 2010, p. 99). Third, we explore how the association between intelligence and nontraditional attitudes varies across development, comparing not only the parent sample against the twins but also the twins’ results at ages 17 and 24. If counter-normative behaviors act as a particularly potent suppressor of the association between intelligence and nontraditional attitudes among adolescents, then intelligence should become an increasingly strong predictor of such attitudes as the child ages.

**Method**

**Participants**

Participants were twin youth (N = 3779) and their parents (N = 3681) from the Minnesota Twin Family Study (MTFS). The MTFS is a longitudinal, genetically informative study focusing on social adjustment and development through adolescence and emerging adulthood (Iacono & McGue, 2002). It consists of two different cohorts of twins: one recruited when the twins turned age 11 and another sample of twins recruited at age 17. The “older cohort” of twins (recruited at age 17) was born between 1972 and 1979, whereas “younger-cohort” twins were born between 1978 and 1994. Age-24 personality data were collected for the older cohort and the oldest subset of the younger cohort (i.e., those born before 1988). Parent data analyzed here
were provided when parents attended their offspring’s intake laboratory visit. The average age of parents at that time was 42.6 years ($SD = 5.7$). Participants were overwhelmingly of non-Hispanic white background (> 95%), coinciding with the demographic makeup of the state of Minnesota in the 20th Century. Males comprised 48% of the twin sample and 48.8% of participating parents. The latter proportion includes stepfathers as well as biological fathers.

**Measures**

**Nontraditional Attitudes**

As indicated above, our assessment of nontraditional attitudes is the Traditionalism scale of the Multidimensional Personality Questionnaire (MPQ; Tellegen & Waller, 2008). Traditionalism captures a broad orientation towards religiousness and conservative social positions (Bouchard, 2009), reflecting the sources of the items, which are drawn from instruments such as the Revised F scale (Lee & Warr, 1969), an index of Authoritarian Family Ideology (Ernhart & Loevinger, 1969), and Rokeach’s (1960) dogmatism scale. Though as noted above Traditionalism is exceptionally strongly correlated with authoritarianism (average $r = .73$; Ludeke, 2016), Traditionalism differs in having little reference to government authority or repression of civil liberties, with a focus instead on strict moral standards. Previous work in adults (Beier & Ackerman, 2001; Bouchard et al., 2003) has shown that Traditionalism’s associations with IQ are moderate in magnitude ($rs$ between -.26 and -.35). This is highly comparable to the meta-analytic association between intelligence and RWA ($r = -.30$ in Onraet et al., 2015).

The 18 Traditionalism items assessed by the MTFS were scattered across a personality booklet of 198 items in a pseudo-random order. Most (twelve) items were pro-trait statements (e.g., “People should observe moral laws more strictly than they do”), but three items were keyed in the reverse direction (e.g., “As young people grow up, they ought to try to carry out some of their rebellious ideas instead of just settling down”), and a further three items were forced-choice scenarios. Participants expressed their agreement with each statement using a four-point rating system (definitely true, probably true, probably false, and definitely false) or, in the case of forced-choice statements, reported their degree of preference for one of two competing statements (definitely A, probably A, probably B, and definitely B). Data were considered valid if respondents answered at least 16 items. The mean item response was multiplied by the total number of items, yielding a theoretical minimum score of 18 and maximum score of 72. A total
of 3,358 parents ($\alpha = .81$) had valid Traditionalism scores; 3,350 twins provided valid age-17 data ($\alpha = .77$), with 2,263 of these providing valid age-24 data ($\alpha = .81$). In all analyses, we reverse-score the scale, such that high scores represent nontraditional attitudes.

**Intelligence**

A standardized intelligence test was administered to participants at their intake visit. All parents and older-cohort twins were given four subtests – Vocabulary, Information, Block Design, and Picture Completion – from the Wechsler Adult Intelligence Scale-Revised (WAIS-R; Wechsler, 1981). The scaled scores from these four subtests were combined to form a composite IQ score. Specifically, we standardized each subtest score separately in males and females to remove extraneous noise due to incidental sex differences in test performance. We then obtained the arithmetic average of the four z-scores.

A similar procedure was followed for younger-cohort twins. However, many of these twins (particularly those born after 1988) were only administered two WAIS-R subtests at age 17. To provide a similarly broad assessment of their general intelligence, we used the participant’s age-11 performance on the corresponding subtest of the Wechsler Intelligence Scale for Children-Revised (WISC-R; Wechsler, 1974). This use of age-11 data is supported by the substantial stability between the age-11 and age-17 data. Among those completing all scales at both assessments, the correlation between the composite intelligence scores across the six years was $r = .78$.

**Counter-Normative Behaviors**

We selected a cluster of counter-normative behaviors frequently found in adolescents that have been incorporated in previous studies of externalizing problems (Hicks, Schalet, Malone, Iacono, & McGue, 2011; Sparks, Isen, & Iacono, 2014). These behaviors garner social disapproval or sanction from established religious, familial, and (sometimes) legal authorities. Many of the selected behaviors (e.g., cigarette use, alcohol consumption, and sex) are considered permissible when engaged by certain classes of individuals (i.e., adults) rather than representing categorically illegal conduct.

To supplement these self-reports of counter-normative behaviors, we also used teacher reports of antisocial personality characteristics and oppositional-defiant behavior. Teacher reports are especially useful from a validity standpoint, as it overcomes the shared self-report method variance between nontraditional attitudes and counter-normative behaviors. Unlike the
substance use and sexual history measures, which are available for both parents and their twin offspring, teacher reports were obviously only available for twins. Unless otherwise noted, all substance use measures were based on information from the twins’ age-17 assessment and the parents’ intake visit. For longitudinal follow-up analyses, we used alcohol and nicotine use data from the twins’ age-24 assessment.

**Nicotine use.** Nicotine use was assessed using a computerized substance use survey as well as a structured interview format (Composite International Diagnostic Interview-Substance Abuse Module (CIDI-SAM); Robins, Babor, & Cottler, 1987). Participants were asked whether they had ever used nicotine at any point in their life. A follow-up question asked how many days per month they used nicotine during the month of their heaviest use. Answers were bounded between 0 and 30. The majority of twins (62.8%) had used nicotine by their age-17 assessment, while an unsurprisingly higher proportion of parents (91%) had used nicotine at some point in their life. Since many parents likely terminated their heaviest period of nicotine use many years before the laboratory visit, we also assessed participants’ frequency of nicotine use in the past 12 months.² This variable showed a pattern of correlations with intelligence and nontraditional attitudes that closely mirrored the lifetime nicotine use measure. Thus, we do not include the past-year nicotine use measure in our primary (non-longitudinal) analyses.

**Binge drinking.** To capture heavy, disinhibited drinking behavior, we utilized a measure of binge drinking from the CIDI-SAM and, for twins who indicated that they drank, the Diagnostic Interview for Children and Adolescents-Revised (Reich & Welner, 1988). First, participants were asked whether they had ever used alcohol in their lifetime. Over two-thirds of twins (69.3%) confirmed that they had consumed alcohol without parental permission. All but 1.6% of parents had used alcohol at some point in their life. Next, the assessment asked participants to estimate the maximum number of drinks they had ever consumed in a 24-hour period. Finally, to provide a contemporaneous (rather than lifetime) measure of alcohol use, we computed a drinking index focusing specifically on frequency and quantity of alcohol use in the past 12 months. Frequency of drinking was an ordinal variable consisting of 6 levels: ‘never’, ‘less than once a month’, ‘about once a month’, ‘1-2 times a week’, ‘3-4 times a week’, and...

² Nicotine use in the past 12 months was organized into a 6-point rating scale: never, less than once a month, 1-3 times a month, 1-2 times a week, 3-4 times a week, and every day or nearly every day. Given the highly addictive nature of cigarette smoking, the frequency distribution was bimodal, with most participants either endorsing ‘never’ or ‘every day’.
‘every day or nearly every day’. Quantity was a count referring to the typical number of drinks consumed within a drinking session. The two measures – frequency and quantity – were both converted to percentile ranks and then averaged to form a composite index.

**Age at first sex.** Parents were asked at the intake visit the age at which they first had sexual intercourse. At the age-17 assessment, twins were asked during a “life events” interview if they ever had sexual intercourse. If so, they were asked a follow-up question about how old they were the first time they had sex. At each subsequent wave (age 20, 24, and 29), the twins were again asked if they ever had sexual intercourse. Affirmative responses prompted the interviewer to ask for the age at which they first had sex *since* the prior assessment. Following the procedure of Harden and Mendle (2011), individuals who did not indicate ever having sex by their oldest assessment were treated as having missing information for age at first sex. This applied to 3.6% (*N* = 89) of the twins that participated in the age-29 assessment. Twins born after 1988 have not had an age-29 visit, but most (88.5%) indicated that they had sex by age 24. Furthermore, five participants (including three parents) reported an age of first sex that was likely to be prepubescent (<11 years) and probably nonconsensual; their data were likewise treated as missing (see Harden & Mendle, 2011).

**High-school GPA.** High-school grades were assessed by asking a primary caregiver (usually the mother) to rate their children’s academic performance across four subjects: English, math, science, and social studies. Ratings followed the familiar GPA scale of 0-4 (F, D, C, B, and A). Twins also reported on their own grades in those classes on the same scale. Self-reported GPA was modestly higher than the parents’ assessment of their children’s GPA (3.11 vs. 3.01; Cohen’s *d* = 0.13), perhaps indicating a social desirability bias on the part of twins. The correspondence between the two raters was high (*r* = .80). We obtained our measure of GPA by averaging across the parent- and self-reports.

**Teacher ratings of oppositionality.** Each twin nominated three or four high-school teachers to rate their personality and behavior. Twins were instructed to nominate school faculty who 1) had recently served as their classroom instructor or extracurricular leader (e.g., coach), and 2) were reasonably well-acquainted with the student. A rating form (described elsewhere: Hicks, Iacono, & McGue, 2014; Isen, McGue, & Iacono, 2015) was mailed to each nominee soon after the age-17 laboratory visit. The items on these forms were each a cluster of personality adjectives (e.g., item 1 was “Cheerful, interested, optimistic”). For each item, the
teacher compared the participant to his or her classmates and indicated whether the participant was in the lowest 5%, lower 30%, middle 30%, higher 30%, or highest 5% of students in class. On average, 2.22 rating forms ($SD = 0.87$) were returned per participating twin.

The authors identified five items representing an oppositional orientation: 1) **Tough, unforgiving, aggressive**, 2) **Values a good reputation, endorses strictness, respects authority**, 3) **Experienced with alcohol or drugs**, 4) **Truthful, trustworthy**, and 5) **Law abiding**. These were supplemented by 9 items capturing features of Oppositional Defiant Disorder (ODD): loses temper, argues with adults, actively defies rules, deliberately annoys other people, blames others for mistakes, touchy or easily annoyed, angry and resentful, spiteful or vindictive, and uses obscene language. These behavioral items were scored on a 4-point rating system (‘not at all’, ‘just a little’, ‘pretty much’, and ‘very much’). To render the 5-point rating system of the personality adjectives commensurate with the ODD behavioral ratings, we multiplied values of the former by a constant of 0.8. Total scores were computed by averaging the 14 items across all raters. Internal consistency reliability was high, Cronbach’s alpha = .92.

**Statistical Analyses**

All substance use variables had non-zero modal values. Some of the counter-normative behavior indicators (binge drinking and teacher ratings) were extremely skewed, and so we transformed scores on each indicator into percentile ranks.

Since the sample consisted of family members, it was not appropriate to use ordinary least squares (OLS) regression analysis. We accounted for the nonindependence of observations (i.e., clustered nature of twin data) by using a sandwich estimator in the Mplus statistical package (Version 7; Muthén & Muthén, 2012). This permits us to compute non-biased standard errors, which are otherwise too small when using the standard OLS method. Missing values are handled by full information maximum likelihood estimation in Mplus. This avoids the problem of listwise deletion when using cases with incomplete data in multivariate analyses.

Statistical analysis proceeded through two stages. First, we conducted bivariate correlational analyses to assess the observed associations between our measures of nontraditional attitudes, counter-normative behaviors, and intelligence.

Second, to quantify the degree of suppression among adolescents, we ran a series of regression analyses predicting nontraditional attitudes. Two regressions looked separately at...
intelligence as a predictor and at a latent factor of counter-normative behavior as a predictor. A final regression combined intelligence and the counter-normative behavior factor as predictors. Suppressor effects are evident when the unique (residual) component of each variable acquires stronger predictive validity than otherwise observed at the bivariate level, i.e., the zero-order effects are suppressed by virtue of the two predictors evincing inverse associations with one another (Blonigen et al., 2010; Conger, 1974).

Results

Mean scores of the study variables are listed in Table 1. Levels of nontraditional attitudes (i.e., reversed Traditionalism scores) at age 17 were slightly lower in female twins than their male counterparts (Cohen’s $d = 0.15$; $p < .001$). However, mothers and fathers did not significantly differ from each other in nontraditional attitudes ($p = .29$, Cohen’s $d = 0.04$). Consistent with this developmental trend, by age 24, nontraditional attitudes no longer significantly differed between male twins ($M = 38.0$, $SD = 7.6$) and female twins ($M = 37.6$, $SD = 6.8$).

There were strong mean-level sex differences in substance use. Males engaged in heavier binge drinking, nicotine use, and alcohol consumption in the past 12 months. This was true for both generations of participants. Male twins also received lower GPAs and higher endorsement of oppositional characteristics from their high-school teachers. However, males and females did not differ in their age at first sex.

Correlational Results

Correlations between the study variables are presented in Table 2. Because the relationship between intelligence and attitudes can vary based on the nature of the assessments used for ideology (Ludeke & Rasmussen, 2018; Onraet et al., 2015; Oskarsson et al., 2015) and intelligence (Beier & Ackerman, 2001; Ludeke, Rasmussen, & DeYoung, 2017; Onraet et al., 2015), an important first step is to examine how these traits associate in the population most commonly studied (adults). Fortunately, parent sample results provide no cause for concern, exhibiting a relationship between intelligence and nontraditional attitudes ($r = .28$; 95% CI: [0.24, 0.31]) that is extremely close to results from prior individual studies using the same attitude.
measure (Beier & Ackerman, 2001; Bouchard et al., 2003) as well as meta-analytic results for the more common measure of this segment of attitude space: authoritarianism ($r = -0.30$; Onraet et al., 2015).

Other elements of the correlation matrix highlight evidence that this relationship is likely subject to statistical suppression. This prospect is clearest among the twins, among whom intelligence was substantially negatively associated with counter-normative behaviors both inside and outside the school context. The weakest associations concerned drinking ($r_s = -0.15$ and $-0.17$ for past-year drinking frequency and binge drinking, respectively), and the strongest associations concerned low GPA and teacher-rated oppositionality ($r_s = -0.45$ and $-0.26$, respectively). Nontraditional attitudes were positively associated with counter-normative behaviors, though with comparatively stronger links with those committed outside the classroom ($r_s = 0.23$ to $0.25$) rather than within it ($r_s = 0.17$ to $0.19$). Not all of these results can be compared to results among parents, for whom schooling-related data are absent. However, where data was available, the counter-normative behaviors were generally less negatively associated with both intelligence and nontraditional attitudes than was found for their adolescent children. This may itself be unsurprising, both on the basis of prior work (Johnson et al., 2010) and based on the behaviors losing much of their rebellious, norm-violating flavor among adults. However, it also indicates that any suppression of the link between nontraditional attitudes and intelligence attributable to counter-normative behaviors may be comparatively pronounced among the twins. Consistent with this, the association between intelligence and nontraditional attitudes was considerably more modest among twins ($r = 0.06$, $p = 0.002$; 95% CI: [0.02, 0.10]) than we had previously observed among parents. We next turn to quantifying the degree of suppression.

**Statistical Suppression**

Table 3 presents results of three path models predicting nontraditional attitudes among the twins. Of particular interest is the shift in the effect of intelligence observed between Model 1 (equivalent to the correlational result) and Model 3 (which includes both intelligence and the latent factor of counter-normative behavior as predictors). Model 3 is represented by the path diagram in Figure 1. Since intelligence is associated with school grades (GPA) in part for reasons that are unrelated to counter-normative behaviors, it was necessary to specify a direct path between the two. The model showed an acceptably close fit to the observed covariance matrix, based on an RMSEA value of $0.049$ (90% CI: $0.041$ - $0.058$). Furthermore, the comparative
fit index was .980, which provides evidence of good model fit. Model 2 from Table 2 represents the regression of nontraditional attitudes on the latent counter-normative behavior factor (omitting intelligence). The variance accounted for by Model 3 ($R^2 = .155$) is greater than the sum of the $R^2$ values of Model 2 and Model 1. Intelligence’s association with nontraditional attitudes triples from .061 to .182, highlighting the substantial suppressive role played by counter-normative behaviors (see Table 3).

We illustrate this suppression effect by regressing nontraditional attitudes on intelligence while stratifying our adolescent sample by level of counter-normative behavior. A composite index was formed by obtaining the average percentile rank across binge drinking, nicotine use, low GPA, teacher-rated oppositionality, and age at first sex. Figure 2 contrasts the link between nontraditional attitudes and intelligence observed in the total twin sample with associations in two selected subsamples: 1) adolescents scoring at least one standard deviation below average on the counter-normative behavior index, and 2) those scoring more than one standard deviation above average on the same index. The standardized regression coefficients for each of the subsamples are substantially larger than the coefficient for the total sample (see Figure 2).

It is noteworthy that including counter-normative behaviors in our model brought the association between intelligence and nontraditional attitudes closer to, though still short of, the raw association observed among the parental generation. This could be potentially attributed to many different factors, but to narrow the field we next consider how this relationship changes as the twins age.

**Longitudinal Analyses**

We have suggested the attenuated association between intelligence and nontraditional attitudes among the adolescent twins might reflect a comparatively pronounced role for suppression arising from counter-normative behaviors. The plausibility of this account would be enhanced if we could rule out alternative accounts (such as cohort differences) in the connection of intelligence and nontraditional attitudes. To this end, we explored age-24 results among the subset of twins ($N = 2,094$) who provided data both at that age and at age 17.

Table 4 shows the correlations among intelligence, nontraditional attitudes (ages 17 and 24), and past-year use of alcohol and nicotine (ages 17 and 24). Matching the results from the

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4The ‘age at first sex’ and GPA percentiles were subtracted from 100 to reflect the same direction as the other variables.

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parent sample, adult (i.e., age-24) use of alcohol and nicotine were less intertwined than they had been among the same individuals during adolescence ($r$ of .43 vs .63), highlighting that these behaviors become more differentiated as they become legal. Also paralleling the parental results, these behaviors showed less marked associations with intelligence and nontraditional attitudes, though individual results were not always significantly different between the two ages. Of greatest interest, intelligence and nontraditional attitudes shift from the modest adolescent association ($r = .07$ among this subset) to a substantially greater link in adulthood ($r = .25$).

**Discussion**

Nontraditional attitudes represent a preference for personal autonomy even in the face of reduced social cohesion (Feldman, 2003). Although personal freedom and nonconformity are highly valued in many societies (Inglehart & Oyserman, 2004), there is broad acknowledgement that youth should be subjected to an extra layer of social control and legal restraint. As such, nontraditional attitudes were linked to a network of counter-normative behaviors and outcomes among adolescents. Less traditional individuals at age 17 were more experienced with nicotine/alcohol use and engaged in sexual intercourse at an earlier age compared to their more traditionalist peers. This pattern was, to a lesser extent, also observed in middle-aged parents.

The present study explored how the well-documented connection between intelligence and nontraditional attitudes is affected by their mutual relationships with counter-normative behaviors. Previous research pointed to the possibility that the positive relationship between intelligence and nontraditional, left-wing attitudes, though substantial (Onraet et al., 2015), could potentially be suppressed by their divergent associations with such “problem” behavior (Ludeke, 2016; Oosterhoff et al., 2017). Any such suppression should be particularly detectable in adolescents, among whom various forms of counter-normative behavior represent a coherent and integrated feature (Vrieze, Hicks, Iacono, & McGue, 2012) with comparatively strong (negative) links with intelligence (Johnson et al., 2010).5

Our results supported this conception, with intelligence and nontraditional attitudes substantially more positively correlated among adults than among adolescents. This held whether the comparison was cross-sectional (parents vs. their adolescent children) or developmental in scope (ages 17 vs. 24). Regression analyses supported the posited suppressor

---

5 Indeed, the construct of problem behavior is more readily operationalized for minors than for adults given the age-graded norms that determine deviance for many commonly assessed behaviors (Jessor, 2017).
role for counter-normative behaviors, with the age-17 relationship between intelligence and nontraditional attitudes tripling once a latent factor for counter-normative behavior was included as a predictor.

Given that adolescence is marked by increased rule-breaking and defiance of authority, the nomological network of nontraditional attitudes may somewhat diverge during these years from its form among adults. As noted above, adolescents with low intelligence are comparatively prone to engage in the rule-breaking that is so salient during the adolescent years. Such behavioral rebelliousness may, in turn, negatively affect the appeal of traditional morality and social norms, especially those emphasizing obedience to conventional authorities and rule following. This may suppress the well-established links intelligence has with nontraditional, left-wing attitudes.

Our observation of a particularly limited association between intelligence and nontraditional attitudes during adolescence aligns with some but not all prior work. A meta-analysis of the links between intelligence and religiosity pointed to a similar developmental pattern (Zuckerman et al., 2013). Given the close links religiousness shows with traditionalism and authoritarianism (Ludeke et al., 2013), a parallel developmental trend might thus be expected. Alternatively, results from a meta-analysis of intelligence and sociopolitical attitudes (Onraet et al., 2015) would seemingly point to precisely the opposite conclusion, as they reported larger associations among adolescents than adults. This, however, appears to largely reflect a complex combination of few samples and problematic coding decisions.

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6 Onraet et al., 2015 scored 8 samples (N = 15,496) as based on adolescent participants. The overwhelming majority (84%; N = 13058) of these “adolescent” participants came from a single study (Kanazawa, 2010) that only assessed intelligence in adolescence, with ideology assessed in adulthood. As our own age-17 and age-24 results show, this can result in adult- rather than adolescent-sized relationships between intelligence and ideology, and so provides no meaningful comparison with our age-17 results. Another study classified by the meta-analysis as using adolescents (Marks & McDougall, 1959) reported the single largest link between intelligence and attitudes (r = -.68) in the entire 67 study meta-analysis. This study of 57 psychiatric aides provides no information on participant age, but due to it representing a workplace study, the classification as adolescent-based seems incorrect. Among the remaining six studies (which provide a substantially smaller overall N than our age-17 sample), one is clearly instructive: Heaven et al. (2011) compared scores on curriculum-based tests with a brief version of Altemeyer’s (1981) RWA measure among 375 adolescent Catholic school students, finding a more negative correlation than expected based on our results (r = -.22). However, this sample also manifested a relationship between religiosity and intelligence that was comparatively more negative than expected based on Zuckerman et al’s (2013) meta-analysis. The remaining five samples are more challenging to interpret: four studies (Francis 1997; Gough 1951; Himmelweit & Swift 1971; Uhes & Shaver, 1971) relied on measures not commonly used in recent decades (Adorno’s F scale and Rokeach’s Dogmatism scale), typically with study-specific rephrasing and scoring decisions, while Egan’s (1989) examination of 94 low-ability students yielded correlations ranging between .15 and -.54 between his two ability tests and two primary political measures.

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An Underdeveloped Nomological Network for Sociopolitical Attitudes

Social science research has often treated right-wing views as pathological deviations from normality that require specific scientific explanation (Duarte et al., 2014). For example, with research on authoritarianism deriving its impetus from the attempt to understand Nazi behavior, it is unsurprising that initial investigations have tended to focus on authoritarianism’s darker aspects such as prejudice, ethnocentrism, and intolerance towards those who deviate from conventional norms (Adorno et al., 1950). This original focus is evident from the tones of hostility and brutishness in the items from Altemeyer’s highly influential Right-wing Authoritarianism Scale (1981/1996). Many of the pro-authoritarian statements express a desire to deploy violence against non-conformists. Some items reveal extreme sentiments (e.g., stomp out rot, eliminate troublemakers, “put [radicals] out of action”, etc.). Given this aggressive tenor, it is easy to ignore any comparatively positive characteristics associated with the less-aggressive elements within right-wing attitudes, including conventional morality and obedience to authority.

It may be that some of the more desirable features associated with authoritarian/traditional viewpoints are both most evident and most consequential in adolescence. Conformity to social norms and obedience to adult authority figures are important elements of child socialization and delinquency prevention (Hirschi, 2002). Indeed, social adjustment is facilitated by at least some degree of respect for the values and expectations of one’s parents and teachers.

Interestingly, traditionalist adolescents in the present study received higher GPAs and were evaluated more positively by their teachers. At first glance, this may seem challenging to reconcile with the well-established finding that educational attainment is correlated with nontraditional attitudes (Van Hiel et al, 2010). However, an important distinction is that previous studies have generally assessed right-wing ideological attitudes in adulthood. Relations between adolescent-measured attitudes and high-school GPA may be quite different than associations between adult-measured attitudes and educational attainment. In this sense, our results closely mirror findings from literature examining the academic correlates of adolescent religiousness (see Horwitz, Domingue, & Harris, 2020). High-school students who endorse greater religiousness earn higher grades and advance further in their post-secondary education. Here too, this does not imply that greater religiousness among adults is correlated with higher educational attainment.
Another interpretation is based on selection: It may be that traditional attitudes are associated with decreased likelihood of pursuing advanced education (perhaps reflecting low Openness) even if they also predict effective performance *within* any education they do pursue. Alternatively, the negative correlation between traditional attitudes and educational attainment may reflect a treatment effect of education. Further work exploring the dynamics of education and opinion change should consider these possibilities.

**Strengths and Limitations**

The present study has several important strengths relative to prior work. Perhaps most notably, studies on intelligence and attitudes cannot typically consider questions of development. Our use of a parent and child cohort, as well as our developmental analyses of the child cohort, are highly distinctive.

Studies on intelligence and attitudes rarely simultaneously escape limitations with respect to statistical power, representativeness, and high-quality and diverse assessment of ability (though see exceptions from Deary et al., 2008; Ludeke & Rasmussen, 2018; Oskarsson et al., 2015; and Schoon et al., 2010). Studies based on political surveys (e.g., Carl, 2014) tend to be large and representative, but use highly abbreviated ability measures of only one segment of intelligence—a limitation which may substantially affect results (Ludeke et al., 2017). Studies with better assessments of ability tend to be comparatively limited in sample size (McCourt et al., 1999; Bouchard et al., 2003) or representativeness (Kemmelmeier, 2008). The present study’s use of the Minnesota Twin Family Study—with clinical assessments of four diverse ability scales, substantial representativeness (Iacono, Carlson, Taylor, Elkins, & McGue, 1999), and very substantial power—thus provides a rare combination of strengths.

A limitation is the present study’s reliance on MPQ Traditionalism to measure sociopolitical attitudes. Although noted above to correlate very highly with Altemeyer’s RWA measure, Traditionalism is very infrequently used in studies explicitly directed towards the sociopolitical sphere, and its nomological network within the sociopolitical realm is underexplored. Although there is little reason to see the measure as distinctive in its relationship with intelligence, the relationship between intelligence and sociopolitical attitudes has been shown to depend on the nature of the attitude assessment (e.g., Kemmelmeier, 2008; Oskarsson et al., 2015). Further study regarding the generalizability of MPQ Traditionalism findings to more established sociopolitical attitude measures would thus be useful.
Conclusions

Nontraditional attitudes and counter-normative behaviors positively covary, especially among younger populations. Youth who attach less value to traditional societal norms appear to have a lower threshold for engaging in deviant, counter-normative behaviors. Contemporary understandings of right-leaning sociocultural attitudes, which commonly focus on a variety of negative consequences of the trait, have under-incorporated the apparent protective role of such attitudes for counter-normative behaviors, many of which can be quite harmful to the individual.

We found evidence that overlooking counter-normative behaviors will also impair our understanding of how intelligence connects to social attitudes. Namely, the relationship between intelligence and nontraditional attitudes will be underestimated—especially among adolescents—when the suppressive role of counter-normative behaviors is neglected. Future work on additional moderators and mediators of the association between intelligence and social attitudes is merited.

References


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Table 1

<table>
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<th>Parents</th>
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<tbody>
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</table>

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### Table 2

**Correlation Matrix for Twins and Parents**

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<tr>
<th></th>
<th>Daughters</th>
<th>Sons</th>
<th>Mothers</th>
<th>Fathers</th>
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<td>M</td>
<td>SD</td>
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<td>39.3</td>
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<tr>
<td>Age at First Sex</td>
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<td>2.8</td>
<td>18.2</td>
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</tr>
<tr>
<td>Cigarette Use</td>
<td>7.5</td>
<td>11.8</td>
<td>9.1</td>
<td>12.4</td>
</tr>
<tr>
<td>Binge Drinking</td>
<td>5.2</td>
<td>6.3</td>
<td>8.7</td>
<td>10.1</td>
</tr>
<tr>
<td>Teacher-rated Oppositionality</td>
<td>1.45</td>
<td>0.39</td>
<td>1.61</td>
<td>0.46</td>
</tr>
<tr>
<td>GPA</td>
<td>3.17</td>
<td>0.71</td>
<td>2.81</td>
<td>0.81</td>
</tr>
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</table>

Notes. Nontraditional attitudes are a reverse-scoring of Traditionalism; Cigarette use is a count of days in which the participant used nicotine during their heaviest month of use; binge drinking is the maximum number of alcoholic drinks consumed within a 24-hour period; oppositionality is based on teacher ratings of the twins’ personality and behavior; GPA is a report of the twins’ most recent high-school grades.

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Table 3

Evidence of Suppressor Effects in Predicting Nontraditional Attitudes at Age 17

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
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<tbody>
<tr>
<td>Intelligence</td>
<td>0.061*</td>
<td>0.182**</td>
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</tr>
<tr>
<td></td>
<td>(0.020)</td>
<td>(0.021)</td>
<td></td>
</tr>
<tr>
<td>Counter-Normative Behavior</td>
<td>0.342**</td>
<td>0.410**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.021)</td>
<td>(0.022)</td>
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</tr>
<tr>
<td>R²</td>
<td>0.004</td>
<td>0.117</td>
<td>0.155</td>
</tr>
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</table>

Note. Standardized regression coefficients are reported with standard errors in parentheses; counter-normative behavior is a latent variable, as depicted in Figure 1.

* p < 0.01, ** p < 0.001

Table 4

Shifting Associations between Intelligence and Attitudes/Behaviors Across Emerging Adulthood
<table>
<thead>
<tr>
<th></th>
<th>1</th>
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<th>4</th>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2) Nontraditional attitudes (Age-17)</td>
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<td></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>3) Past-year alcohol use (Age-17)</td>
<td>-.17</td>
<td>.27</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>4) Past-year nicotine use (Age-17)</td>
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<td>.28</td>
<td>.63</td>
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<td>5) Nontraditional attitudes (Age-24)</td>
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<td>6) Past-year alcohol use (Age-24)</td>
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<td>.42</td>
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<td>7) Past-year nicotine use (Age-24)</td>
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<td>.27</td>
<td>.39</td>
<td>.62</td>
<td>.16</td>
<td>.43</td>
</tr>
</tbody>
</table>

Notes. Coefficients in boldface are of primary interest. Coefficients in italics represent correlations specific to a certain period (age-17 or age-24).

<sup>a</sup>p > .001

**Figure 1**

*Path Diagram Showing the Joint Contributions of Intelligence and Counter-Normative Behavior to Nontraditional Attitudes.*
Notes. Rectangles represent manifest variables and the oval represents the latent counter-normative behavior factor. Circles denote the residual variance for each manifest variable; there was substantial residual covariance between the binge drinking (alcohol) and nicotine use measures as well as between teacher-rated oppositionality and low GPA. Paths represented by the dashed lines are reported in Table 3 (Model 3), in which nontraditional attitudes is regressed on both intelligence (IQ) and counter-normative behavior. All path coefficients are standardized, with standard errors reported in parentheses.

Figure 2
Regression of Nontraditional Attitudes on Intelligence in Twins
Note. Norm-violating adolescents score at least one standard deviation above average on an index of counter-normative behavior (early age of first sex, binge drinking, nicotine use, poor grades, and teacher-rated oppositionality). Norm-conforming adolescents score at least one standard deviation below average on this index. Error bars represent standard errors around each standardized regression coefficient, and are adjusted for sibling clustering within families.
Table 1

Descriptive Statistics in Parents and their Twin Offspring

<table>
<thead>
<tr>
<th>Variable</th>
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<th>Parents</th>
<th></th>
<th></th>
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<tbody>
<tr>
<td></td>
<td>Daughters</td>
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<td>7.3</td>
<td>18 – 67</td>
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<tr>
<td>Age at First Sex</td>
<td>18.2</td>
<td>2.8</td>
<td>18.2</td>
<td>2.9</td>
<td>18.8</td>
<td>2.8</td>
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<td>Cigarette Use</td>
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<td>6.3</td>
<td>8.7</td>
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<td>1.61</td>
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<td>.11</td>
<td>.13</td>
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<td>-.13</td>
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<td>-.03*</td>
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<td>.34</td>
<td>.34</td>
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<td>4) Cigarette use</td>
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<td>6) Past-year drinking</td>
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<td>.31</td>
<td>.39</td>
<td>.33</td>
<td>.28</td>
<td>.49</td>
</tr>
</tbody>
</table>

Notes. Twins are listed in the lower triangular portion; parents in the above portion; all values refer to Pearson product-moment correlation coefficients; Past-year drinking represents the temporal frequency and typical quantity of drinks consumed in the past 12 months; GPA = grade-point average (reversed).

*p > .001
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