RESEARCH LETTER

Association of High Traditional Masculinity and Risk of Suicide Death: Secondary Analysis of the Add Health Study

In the United States, men die by suicide at 3.5 times the rate of women.[1] One driver of this gender disparity may be high traditional masculinity (HTM), a set of norms that includes competitiveness, emotional restriction, and aggression.[2] Quantitative studies of HTM are interrelated with discourse on hegemonic masculinity.[3] Using norm- and trait-based measures, HTM men were found to have higher suicidal ideation (SI),[2,4] but to our knowledge, the association with suicide death has not been tested with a credible measure of HTM.

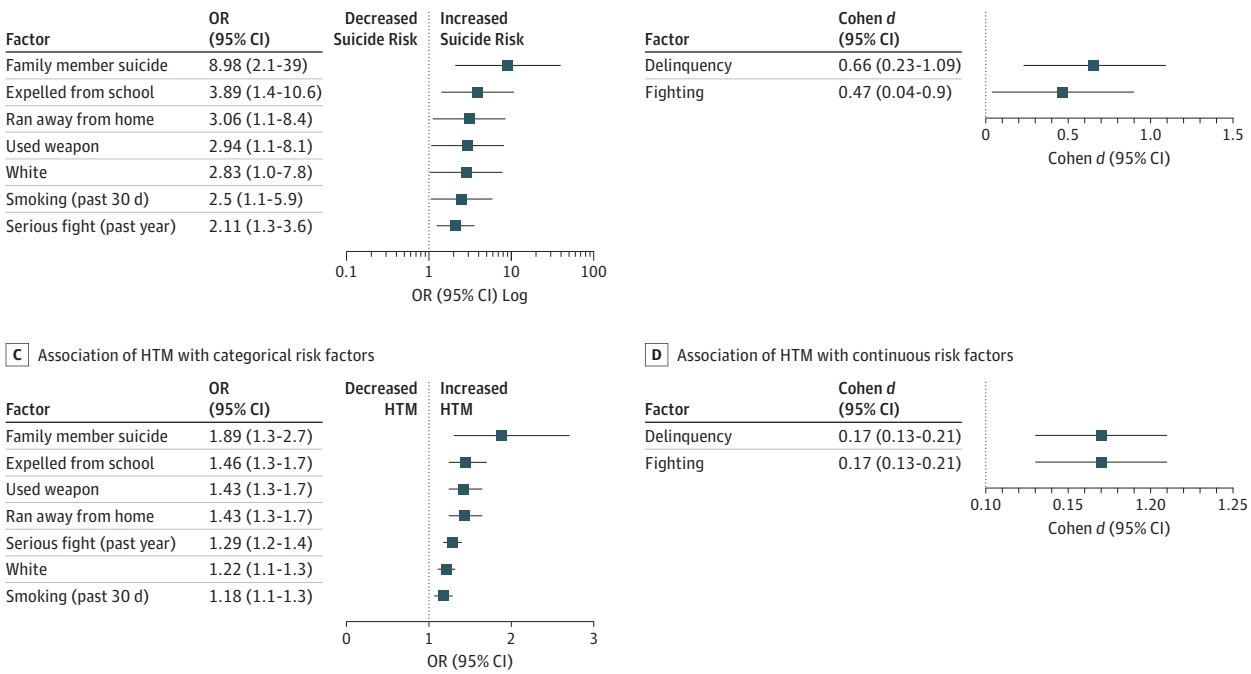
Add Health is a nationally representative study of adolescents into adulthood. Feigelman and colleagues[5] found 9 Add Health variables associated with suicide (**Figure**, A and B) and weak nonsignificant effects for depression and gun access. This study hypothesizes that HTM is associated with suicide, depression, gun access, and the 9 variables previously noted. No prediction was made for HTM regarding SI or suicide attempts.

Methods | Add Health began with 20 745 adolescents in 1995 and in 2014 was matched with death records using the National Death Index. The details of the methods of Add Health can be found at http://www.cpc.unc.edu/addhealth. The Add Health study was reviewed and approved for human participant issues at the University of North Carolina Chapel Hill. Under that protocol, written informed consent was elicited from all participants. The secondary analysis of this data was approved by the institutional review board at Fordham University.

Death by suicide was defined by National Death Index procedures. Through the use of a method novel to suicide research, an established procedure was replicated for scoring gender-typed attitudes and behaviors in which a single latent probability variable of identifying as male was generated from 16 gender-discriminating variables (including not crying, physically fit, not moody, not emotional, liking yourself, fighting, and risk taking).[6] Participants scoring 73% probability or higher of identifying as male (>1 SD above the mean) were coded as HTM. Details of additional variables can be found in Feigelman et al.[5] Because of the small number of suicides, the analysis was limited to bivariate tests and effect sizes: χ^2 and odds ratios (ORs) and *t* tests and Cohen *d*. Stata, version 14 (StataCorp), was used for all data analyses and the criterion *P* value was set at $P < .05$.

Results | Of the 22 suicide deaths, 21 were men (OR, 21.7; 95% CI; 2.9-161; $\chi^2 = 18.8$; $P < .001$). All subsequent analyses include men only. High-traditional masculinity men were 2.4

Figure. Forest Plots of Factors Associated With Suicide Death and High Traditional Masculinity (HTM)



A and B, Feigelman et al[5] risk factors for suicide death. C and D, Association of HTM with risk factors. All tests, $P < .05$. OR indicates odds ratio.

Table. χ^2 and *t* Test of Factors Associated With High Traditional Masculinity Among Male Respondents

Measures	HTM, No. (%)		Total, %	OR (95% CI)	χ^2 (*df*)	*P* Value
	Yes	No				
Suicide death						
Yes	10 (.3)	9 (.1)	0.19			
No	3084 (99.7)	6747 (99.9)	99.8	2.4 (0.99-6.0)	3.979 (1)	.046
Total, No.	3094	6756	9850			
Suicidal thoughts[a]						
Yes	249 (8)	760 (11.1)	10.2			
No	2856 (92)	6048 (88.8)	89.8	0.69 (0.60-0.81)	23.06 (1)	<.001
Total, No.	3105	6808	9913			
Suicide attempt[a]						
Yes	62 (2)	164 (2.4)	2.3			
No	3076 (98)	6683 (97.6)	97.7	0.82 (0.61-1.1)	1.71 (1)	.19
Total, No.	3138	6847	9985			
Easy access to guns						
Yes	1020 (32.5)	2085 (30.4)	31.1			
No	2118 (67.5)	4764 (69.6)	68.9	1.1 (1.01-1.2)	4.27 (1)	.04
Total, No.	3138	6894	9987			
Depression				Cohen *d* (95% CI)	*t* (*df*)	
Mean (SD)	9.59 (6.17)	10.73 (6.98)	NA	0.17 (0.13-0.21)	7.81 (9936)	<.001
Total sample size, No.	3121	6817	9938	NA	NA	NA

Abbreviations: HTM, high traditional masculinity; NA, not applicable; OR, odds ratio.

[a] During the past year.

times more likely to die by suicide than non-HTM men (χ^2 = 3.979; *P* < .046; **Table**) but were 1.45 times less likely to report SI (χ^2 = 23.06; *P* < .001). There was no association between HTM and suicide attempts. High-traditional masculinity men were slightly more likely to report easy gun access (OR, 1.1; 95% CI, 1.01-1.20; χ^2 = 4.27; *P* < .04) and had modestly lower depression levels (Cohen *d*, 0.17; *P* < .001).

All 9 risks for suicide from Feigelman et al[5] were positively associated with HTM (Figure, C and D), with small to small-medium effect sizes.

Discussion | To our knowledge, this is the first study to show that HTM is associated with subsequent suicide among men. In addition to a direct association with suicide death, the association of HTM with all other risks suggests a web of indirect effects. In male suicide death, HTM may be an underlying influence increasing the probability of externalizing behavior risk factors, such as anger, violence, gun access, and school problems. The finding that almost all suicide decedents were men underlines the central role of gender in suicide death. The protective or null association of HTM with nonfatal suicidal behavior mirrors the gender differences in suicide death and nonfatal attempts but conflicts with previous studies of HTM. Relevant interpretive theories of these findings include the Canetto cultural scripts theory and the Baumeister escape suicide theory.[2]

The measure of HTM is based on a well-established method[6] and the 16 gender-discriminating variables are consistent with US relevant masculinity theory and measures in content, but its convergent validity with measures used in previous suicide research is unknown. Other limitations include that the small number of suicides precluded multivariate analyses and Add Health has no coding of gender identity other than male or female. This study should catalyze research, prevention, and intervention attention to the role of masculinity in suicide.

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Concept and design: Coleman, Feigelman.
Acquisition, analysis, or interpretation of data: All authors.
Drafting of the manuscript: Coleman, Rosen.
Critical revision of the manuscript for important intellectual content: Coleman, Feigelman.
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Additional Information: Information on how to obtain the Add Health data files is available on the Add Health website (http://www.cpc.unc.edu/addhealth).

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COMMENT & RESPONSE

Is There an Association Between Social Media Use and Mental Health? The Timing of Confounding Measurement Matters

To the Editor Riehm et al[1] report an association between social media use and increased risk of internalizing and combined internalizing/externalizing problems 1 year later (between waves 2 and 3 of Population Assessment of Tobacco and Health study data), controlling for psychopathology and alcohol/marijuana use at wave 1. However, the analytic strategy is vulnerable to substantial residual confounding.

The authors only controlled variables measured at wave 1 to avoid potentially controlling for mediators, omitting psychopathology measured concurrently to wave 2 social media use. While this strategy has the benefit of temporality, it also has serious drawbacks for causal identification. Wave 1 was prior to the modal onset of adolescent psychopathology[2]; thus, wave 1 may not be an adequate proxy for the underlying mental health risk associated with wave 3 psychopathology. Indeed, multiple curious associations appear in Table 2 in the study by Riehm et al[1] that suggest that wave 1 measures were not adequately capturing confounding. Wave 1 marijuana use appears to have a protective association with wave 3 psychopathology, and alcohol use was not associated, which is inconsistent with large existing literatures.[3] Wave 1 psychopathology had surprisingly small associations with wave 3 psychopathology; indeed, more than 3 hours of social media use per day at wave 2 was more associated with psychopathology than prior psychopathology. These patterns are implausible.

Population Assessment of Tobacco and Health study data are publicly available. We replicated the authors' analyses, adding controls for wave 2 substance use and psychopathology. Specifically, we identified the social media, psychopathology, and control variables that were used by the authors, categorized them identically, and were able to generally replicate sample sizes and associations published in Tables 1 through 3 in the study by Riehm et al.[1] Then, we added wave 2 substance use and psychopathology into the model; the sample size decreased to 6413 owing to a small amount of missing data. While our strategy may have adjusted for a limited partial mediator, as wave 2 social media and psychopathology/substance use were measured concurrently, there is little doubt that using wave 2 variables controlled for underlying psychopathology risk more rigorously.

When included, all associations between wave 2 social media and wave 3 psychopathology were null, save for more than 6 hours per day of social media use, associated with combined internalizing/externalizing problems (odds ratio, 1.52; 95% CI, 1.04-2.22). When examined as continuous scales, social media use of more than 6 hours per day increased internalizing/externalizing symptoms just 0.38 points (SE = 0.17, P = .03) and explained 0.08% of symptom variance. Prior work also demonstrated that associations between digital media and well-being are highly sensitive similar measurement concerns.[4]

Misunderstanding of causal graphs (directed acyclic graphs) may have contributed to the limitations of the analytic plan. The intended purpose of directed acyclic graphs is as a causal identification strategy for all known and unknown sources of bias[5]; authors include only wave 1 measured variables as potentially contributing to bias and as such, selection into high social media use based on psychopathology is among the critical omissions.

In summary, measuring confounders prior to exposure and outcome is useful but not when the resulting confounders are uninformative. Caution should be taken in interpretation of these results.

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