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Measuring Media Exposure to Acute Mass Violence

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Objective: Researchers have studied the influence of media exposure to acute mass violence (e.g., terror attack, mass shooting, etc.) on distress in populations not directly experiencing the trauma; however, the field has yet to achieve consensus on the measurement of media exposure. There has been a rapidly changing media environment since this body of research began, with the rise of social media. To address this, we developed a measure using the most relevant items from media exposure surveys and accounting for evolving social media. ***Method:*** We asked a sample of youth and adults (N = 1,249), ages 14 – 59 years old, about average time spent consuming news in general, time spent viewing coverage of specific terror attacks, and their emotional reactions to the media coverage. ***Results:*** A confirmatory factor analysis specifying a 3-factor model was run on a subsample of the data (n = 308), and the data fit the model well, $\chi^2(17) = 30.799$, $p < .05$, root mean square error of approximation = .051 [90% confidence interval = .020, .080], comparative fit index = .989, and standardized root mean square error of approximation = .043. Measurement invariance was examined on the remainder of the participants (n = 937) to determine whether the model was invariant across participant sex. ***Conclusion:*** Analyses support that the factor structure of the measure was consistent across male and female participants. Implications on measuring media exposure to acute mass violence will be discussed.

Clinical Impact Statement
Our public health response to media exposure to acute mass violence is guided by the empirical data collected, which is influenced by how exposure is measured. Improving consistency in measurement of media exposure to acute mass violence will clarify its impact on mental and physical health.

Keywords: media exposure, factor analysis, terrorism, violence, measurement

In the last few years, in the United States, acute mass violence (AMV; Shultz et al., 2014) has increased in frequency (Lowe & Galea, 2017), often with graphic live footage from cell phones being broadcast widely on traditional and social media. AMV refers to incidents of violence that tend to target unsuspecting people, typically unaffiliated with the perpetrator, often in a public place normally considered safe. Incidents that some have labeled terrorism or mass shootings are examples. As there can be a variety of perpetration methods (e.g., attacks with cars, bombing, stabbing, shooting) terms like *mass shooting* do not capture all potential acts. Similarly, existing definitions can be problematic. Even if the perpetration method was a shooting, the Federal Bureau of Investigation definition involves at least four people dead, besides the perpetrator, to be labeled a mass shooting (RAND, 2018), so an incident where 20 people are shot, but only three die, would not be considered with that definition. In addition, the term terrorism can be problematic, as what is called terrorism can be politically motivated or influenced by implicit bias. We use the term *acute* to differentiate these types of incidents from mass violence that is more chronic, like war or areas of the world that experience chronic acts of political violence.

Viewers are now witnessing AMV events from a vantage point they likely never would have seen 20 years ago. Tragedies like those in Orlando, Florida; Paris, France; London, United Kingdom; Las Vegas, Nevada; Parkland, Florida; Thousand Oaks, California; and more, each with its own intense media coverage, create an environment where the possibility of being a victim of AMV is constantly being portrayed. The media coverage of AMV events means that their impacts are felt broadly. In surveys of community samples, media exposure to AMV was related to posttraumatic stress, anxiety, and distress in viewers who were not directly impacted by the events (Ahern, Galea, Resnick, & Vlahov, 2004; Busso, McLaughlin, & Sheridan, 2014; Gershoff, Aber, Ware, & Kotler, 2010; Holman, Garfin, & Silver, 2014; Pfefferbaum et al., 2003; Silver et al., 2013). Media exposure to AMV can also have a detrimental influence on sleep and physical health (Goodwin, Lemola, & Ben-Ezra, 2018; MacGeorge, Samter, Feng, Gillihan, & Graves, 2004; Vasterman, Yzermans, & Dirkzwager, 2005; Silver et al., 2013). The empirical study of media exposure to AMV began following the Oklahoma City, Oklahoma, bombing

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in 1995 (Pfefferbaum et al., 2003) and the September 11, 2001, terror attacks (Silver et al., 2013), when media coverage consisted mainly of print and TV news. Advances in technology and the advent of social media have dramatically changed how "media" exposure has been conceptualized over the last few decades. Consequently, our measurement approaches, specifically, the questions we ask, have needed to change. Yet, the field does not have a consensus on what to ask. In this study, we surveyed the landscape of media exposure questions to develop and test the psychometrics of the Media Exposure to Acute Mass Violence Scale (MEAMVS).

Media Exposure to Acute Mass Violence Can Cultivate Our Sense of Reality

Cultivation theory and research, originally proposed by Gerbner in the 1970s, suggests that much of what we know and think about the world and reality comes not from personal experience, but from stories we hear, with the media as one of the largest and most influential storytellers of our time (Morgan & Shanahan, 1997). A meta-analysis supports that media exposure cultivates our sense of social reality across a variety of domains (Morgan & Shanahan, 1997). Applied to AMV, cultivation theory suggests that the intense media coverage of these events not only shapes our perceptions of the world and risk, but does so disproportionately, in that expectations do not match up with the actual, low probability that anyone of us will experience such tragedy (Comer, Furr, Beidas, Weiner, & Kendall, 2008; Morgan & Shanahan, 1997). Cultivation theory emphasizes the amount of overall exposure having an effect on our perceptions of reality, not necessarily the influence of any particular type of media.

Furthermore, perpetrators of AMV intend to use the media as a public stage for communicating their messages (Muschert, 2013). Perpetrators exploit media coverage of events to heighten a sense of threat beyond those directly affected, and surpassing what a single attack alone can do (Slone & Shoshani, 2010). Media coverage can amplify perception of risk, frame the issue, and even lead to media hypes (Vasterman et al., 2005). Terrorism and mass shootings are especially prone to a media hype, which is typically triggered by unusual and shocking events, and this can lead to a news wave that substantially increases viewers' exposure to distressing content (Vasterman et al., 2005). Indeed, some have labeled the media coverage of terror events as leading to "second hand terrorism" (Comer & Kendall, 2007), which was the intention of the terrorists.

Simultaneously, the public often relies on the media to understand these traumatic events, their causes, and effects (Muschert, 2013). The media tends to follow a script in their coverage of AMV, with the content changing from details of the event, perpetrators, and victims in the immediate aftermath; to public grieving in the days that follow; to a broader search for meaning in subsequent weeks (Muschert, 2013). Coverage drops rapidly after 2 weeks, as the media moves to other stories, often another incident of AMV somewhere else in the nation or world. The continual repetition of this coverage means that the constructs of AMV risk becoming increasingly accessible and salient in the minds of viewers (Shrum, 2002). Indeed, researchers have begun to distinguish between acute media exposure of a single event like 9/11 terror attack and chronic media exposure of repeated mass violence events (Gvirsman et al., 2014).

The hypothesized impact of media exposure to AMV is supported by experimental work. Exposure to media clips of terrorism in a laboratory setting increased state (current) anger and state anxiety in viewers (Slone & Shoshani, 2010). This is profound as these effects followed only 12 min of nonlive coverage, less than the likely exposure most people experience. Our natural viewing habits may lead many of us to more frequent and intense media exposure to AMV than this lab study. In surveys of community samples, media exposure to AMV was related to posttraumatic stress, anxiety, distress, and sleep problems in viewers who were not directly impacted by the terror events (Ahern et al., 2004; Busso et al., 2014; Gershoff et al., 2010; Goodwin et al., 2018; Holman et al., 2014; Pfefferbaum et al., 2003). Indeed, media hype following disaster and terrorism was linked to widespread physical and mental health symptoms in a community (Vasterman et al., 2005) and a nation (Silver et al., 2013). By constantly replaying distressing images, the media can keep the images alive in one's mind, which encourages the ruminative thinking that is linked with distress (Holman et al., 2014). This has led social scientists to point out the potential public health implications of mass media coverage of AMV (Holman et al., 2014).

Measurement of Media Exposure Has Varied

Although researchers have been measuring vicarious exposure to AMV through various media sources for over two decades, there is no established measure of media exposure. Each research team appears to have constructed their own measures for a particular study, given their context at the time. To our knowledge, none of these measures has been examined in terms of its structural psychometric functioning. When research on media exposure to AMV began in the 1990s and early 2000s, it largely studied print and TV broadcast media, because that was what was predominant. The Internet and social media were not the widespread purveyors of information that they are currently. By the time of the Boston Marathon bombing in Boston, Massachusetts, in 2013, researchers started to ask questions about social media, as a form of media exposure (Holman et al., 2014). Researchers consistently asked about amount of exposure to media coverage, often by source (print, TV, online; e.g., Pfefferbaum et al., 2003; Goodwin et al., 2018; Silver et al., 2013). This could be because of the hypothesized dose-response relationship between exposure and distress, which can extend beyond direct exposure to include knowledge of the events through the media (Wilson, 2014). Indeed, a dose response relationship has been found in media exposure studies (Holman et al., 2014). The response options provided by researchers have varied by study, from *never* to *many times* (e.g., Gvirsman et al., 2014) to estimates of hours viewing different types of media coverage each day (e.g., Goodwin et al., 2018; Holman et al., 2014; Silver et al., 2013). A time frame to consider postevent sometimes was specified, usually the first 7 days after the attack (e.g., Silver et al., 2013; Holman et al., 2014) or the weekend after the attack (Goodwin et al., 2018), but other researchers did not provide a time frame, but rather a general perception (e.g., Gvirsman et al., 2014; Pfefferbaum et al., 2003).

Some research teams have asked about emotional reactions to the media coverage, including sad, afraid, nervous, and mad, and

found emotional reactions served as a moderator of the media exposure to distress relationship (Pfefferbaum et al., 2003). Our research team conducted an earlier study exploring how emotional reactions to media exposure to AMV were correlated to different parenting behaviors. We found that reactions of sad or mad were related to different parenting behaviors than reactions that were anxious. Given the different correlations based on different emotional reactions, we felt that one subscale should be Anxious Emotions and the other subscale should Other Negative Emotions. If these were combined into one global, negative emotions subscale, then we may be missing important distinctions with psychosocial, health, and behavioral outcomes that we should be exploring.

With one exception (e.g., Gvirsman et al., 2014), the studies cited here focused on one specific event. However, there has been increasing frequency of numerous events covered in a short amount of time. At the time our research team started developing the MEAMVS, in June to July 2016, there was intense media coverage of AMV incidents in Orlando; Dallas, Texas; Turkey; Bangladesh; Iraq; and France, all of which occurred in a 1-month time frame. Hence, it became apparent that general time spent watching the news or on social media, whether or not you are actively seeking this type of information, may play a role in the transmission of distress. This may need to be controlled for in studies assessing the influence of media exposure to a specific event on distress. In contexts where multiple high profile incidents occur in a short period of time, researchers may want the option of general questions about media coverage to supplement asking questions about each specific event. Thus, we added questions on general time consuming media.

Current Study

We developed the MEAMVS to provide some consistency in the measurement of media exposure and to assess different facets of the media exposure experience, such as general time viewing different types of media, consumption of AMV-specific media, and emotional reactions to the media coverage. We assessed the following approaches to psychometric analysis to understand the functioning of the MEAMVS with a combined sample of youth and adults in the United States: (a) Confirmatory factor analysis (CFA) was used to assess a hypothesized three-factor structure consisting of Time Consuming AMV-Related Media, Anxious Emotions, and Other Negative Emotions; (b) following the factor analysis, measurement invariance for the factor structure of the MEAMVS was examined by sex.

Method

Participants

This study included an overall sample of 1,249 participants that came from three different groups made up of youth aged 13–17 (n = 406), college students aged 18–32 (n = 350), and parents aged 21–59 (n = 493). The MEAMVS was designed to be a universally-applicable measure for adolescent and adults, which supports our combining the subsamples. The mean age of all participants was 25.51 years (SD = 10.80; range = 10–59 years), and the majority (75.3%) were female. Participants had the following ethnic distribution: 41.8% White, 19.1% Latinx, 17.7% Asian or Asian American, 10% African American, 8.6% mixed, 8% Native American or Alaska Native, and 2.0% other. A subsample (n = 308; 24% of the overall sample) was randomly selected to confirm the factor structure. The remaining participants (n = 937) were subsequently used to examine the measurement invariance of the factor structure across sex; four people who did not report their sex were excluded. Splitting the overall sample in this way allowed us to have the statistical power needed to test the parameters in the initial CFA while reserving enough participants to test invariance by sex, which required more participants than the initial CFA to allow for separate CFAs to be run for females and males. The CFAs in the invariance test also served as a replication of the initial CFA with an independent sample.

Procedure

The survey was administered in English, the dominant language of participants. The study procedures for all groups were approved by the human subject's division of two California universities. College students were recruited through undergraduate classes and received extra credit for their participation. The youth subsample, ages 13–17, participated through an opt-in Qualtrics panel, and received incentives per the panel system. The parent sample was recruited from Amazon Mechanical Turk; an online labor market where individuals complete online surveys that are posted on the website. To be eligible to participate in the study, parents had to have at least one child between the ages of 0 and 18 years.

Measure: Media Exposure to Acute Mass Violence Scale (MEAMVS)

The items for the MEAMVS were developed using the items from three different media exposure surveys (Holman et al., 2014; Pfefferbaum et al., 2003; Silver et al., 2013) as well as questions from the research team on general time consuming different media sources. We created three different subscales: Time Consuming AMV-Related Media, Anxious Emotions, and Other Negative Emotions (see Table 1). Time Consuming AMV-Related Media inquired about hours per day spent watching media coverage of the event. The response options included *less than 1 hr per day*, *1–3 hr per day*, and *4 or more hr per day* which were chosen based on the seminal study by Silver et al. (2013). For this study, several events occurred in the same time period, so we asked about three different AMV events, but not every participant was asked about each event, depending on the time of data collection and what events were current. Emotional reactions to the AMV events were based on a study of the Oklahoma City bombing (Pfefferbaum et al., 2003). The subscale Anxious Emotions included three items and assessed emotional responses to an episode of AMV. For this subscale participants were asked "how much did this media coverage make you feel . . .?" and are given a list of emotions (e.g., fearful, uncertain, nervous). The subscale Other Negative Emotions included two items asking, "How much did this media coverage make you feel sad and mad?" Response options for emotion items ranged on a scale from 0 (*not at all*) to 10 (*extremely*).

Although not included in the CFA, we also pilot-tested some items asking about general time consuming media, that may be useful for research in this area. Inspired by Nellis and Savage (2012), we created a question assessing attention paid to AMV-

Table 1
Media Exposure to Acute Mass Violence Scale Subscales, Items, and Response Options

Subscale	Items (response options)
General Time Consuming Media (not included in CFA, for control purposes only)	On average, how many hours per day . . . do you watch TV? (Fill in the blank item) are you online (include all activity, such as social media, using the internet on a computer or cellphone)? (Fill in the blank item) do you normally spend watching the news on TV or online, or reading news articles (through websites, blogs, social media)? (Fill in the blank item)
Attention to AMV-Related Media (not included in CFA, for control purposes only)	In the week that followed the_____ terror attack/mass shooting, about how much time each day have you spent watching media coverage (on TV, online, newspapers) of this? Please give us your best estimate for the first 7 days after the attack. (*no attention at all*, *a little attention*, *some attention*, *a lot of attention*)
Time Consuming AMV-Related Media	In the week that followed the (insert event of mass violence), about how much time each day have you spent watching media coverage (on TV, online, newspapers) of this? Please give us your best estimate for the first 7 days after the attack. (*less than1 hr per day*, *1–3 hr per day*, *4 or more hr per day*)
	Event 2
	Event 3
Anxious Emotions	How much did this media coverage make you feel . . . fearful? (0 = *not at all* to 10 = *extremely*) nervous? (0 = *not at all* to 10 = *extremely*) uncertain? (0 = *not at all* to 10 = *extremely*)
Other Negative Emotions	How much did this media coverage make you feel . . . sad? (0 = *not at all* to 10 = *extremely*) mad? (0 = *not at all* to 10 = *extremely*)

Note. CFA = confirmatory factor analysis; AMV = acute mass violence.

related media coverage. The response options included, *no attention at all*, *a little attention*, *some attention*, *a lot of attention*, and *decline to answer*. Also, given the experience of so many incidents of AMV in a single month, our research team decided to pilot questions on general time consuming media, where participants can put in the number of hours per day, on average, they consumed media coverage of the event. This was based on the idea that these may be good control or comparison variables, as heavy media consumers are simply more likely to encounter news on AMV.

Results

Preliminary analyses were conducted on the overall sample to determine whether the variables included in the CFA analyses met all prerequisite assumptions. Several plots including histograms, box plots, and Q–Q plots were used to assess for univariate and multivariate normality. Skewness and kurtosis values were also examined to gauge univariate normality. Results revealed that most of the variables exhibited univariate normality and all variables had unimodal distributions. Skewness and kurtosis were also found to fall within the critical limits (|2.0| for skewness and |7.0| for kurtosis; Chou & Bentler, 1995; Curran, West, & Finch, 1996) Interitem correlations were found to be moderate and significant ($p < .05$). No major concerns of multicollinearity were found among the bivariate correlations. Table 2 provides a summary of bivariate correlations, means, and standard deviations for each item included in the model for Sample 1 (CFA) and Sample 2 (invariance testing). Taken together, the results of the preliminary analyses suggest that the data met all prerequisite assumptions for the CFA.

Confirmatory Factor Analysis

Using our factor analysis subsample ($n = 308$), we conducted a CFA specifying a three-factor structure representing the three subscales from the MEAMVS: AMV-Related Media Consumption, Anxious Emotional Responses, and Other Negative Emotions. No correlated residuals were theoretically or practically supported for this model. The CFA results, when considered together, revealed that the fit statistics for the three-factor solution showed adequate fit to the observed data (Brown, 2015), see Table 3. Inspection of the item loadings using a cutoff of .5 (considered of moderate magnitude; Brown, 2015) revealed that all of the items included in the scale were at or above the loadings' cutoff. Moreover, modification indices did not indicate the need for any additional changes to the model. Thus, the three-factor model containing all of the original items was retained (see Figure 1 for standardized factor loadings).

In addition to determining the number of factors and items retained in the model, Cronbach's alpha was examined for each of the three factors to assess internal consistency with the factor analysis subsample. The Time Consuming AMV-Related Media factor was found to have adequate internal consistency ($\alpha = .69$), which is expected given it asked about three different AMV incidents. Depending on if a research team is examining the impact of a single event or multiple events, the researcher may simply have one item measuring this or multiple. Conversely, the factors for Anxious Emotions ($\alpha = .92$) and Other Negative Emotions ($\alpha = .86$) were each found to have good internal consistency.

Measurement Invariance by Sex

A multiple-group CFA was conducted to determine whether the three-factor model was invariant across participant sex; Table 3 shows the fit indices for each step in the analysis. For this set of analyses, we used the remaining participants ($n = 937$) which formed the invariance subsample. In the first step, the final CFA model was reexamined with the invariance subsample. Results indicated adequate fit to the observed data (see Table 3), replicat-

Table 2
Correlation Matrix for CFA Sample (N = 308) and Invariance Sample (N = 937)

Item	1	2	3	4	5	6	7	8
1. Time-Consuming AMV Event 1	—	.52**	.57**	.24*	.22**	.19**	.21**	.24**
2. Time-Consuming AMV Event 2	.42**	—	.51**	.10*	.11*	.09*	.06	.07
3. Time Consuming AMV Event 3	.46**	.41**	—	.13**	.09**	.07	.10*	.15**
4. Anxious emotions 1	.32**	.11	.17*	—	.83**	.64*	.60**	.56**
5. Anxious emotions 2	.33**	.11	.17*	.87*	—	.74**	.53*	.52**
6. Anxious emotions 3	.31**	.11	.20*	.72**	.78**	—	.43**	.43**
7. Other negative emotions 1	.33**	.10	.25**	.66**	.61**	.57**	—	.76**
8. Other negative emotions 2	.33**	.11	.19*	.61**	.56**	.50**	.76**	—
M (CFA)	1.44	1.24	1.26	5	4.66	4.52	6.84	6.26
SD (CFA)	.58	.49	.48	3.26	3.23	3.3	3	3.35
M (Invariance)	1.43	1.31	1.33	5.08	4.48	4.26	6.80	6.38
SD (Invariance)	.58	.53	.56	3.24	3.29	3.18	3.08	3.28

Note. CFA sample statistics are below the diagonal and invariance testing sample statistics are above the diagonal. CFA = Confirmatory factor analysis; AMV = acute mass violence.
* $p < .05$. ** $p < .01$.

ing what was found in the original CFA analysis. Next, separate CFAs were run for males and females to determine whether the model fit adequately for each group. Fit indices supported the three-factor solution for both male and female participants, indicating that it would be appropriate to proceed with measurement invariance testing.

Testing measurement invariance of the three-factor solution involved multiple steps that included testing for configural, metric, and scalar invariance. Configural invariance was tested by fitting the three-factor model to both groups (males and females) simultaneously and examining if there were differences in the number of factors across groups. Results supported configural invariance for the three-factor model. In the next step, metric invariance was tested by examining invariance of the factor loadings across groups, which involved constraining the factor loadings to equality for males and females. Results from this step also suggested that model fit did not significantly decrease (Δcomparative fit index > .01; Cheung & Rensvold, 2002) supporting metric invariance of the three-factor structure for males and females. Lastly, scalar invariance was tested by running a new model for both groups simultaneously, constraining factor loadings and factor intercepts to be equal. Again, results indicated that the model fit adequately and that there was no significant decrease in model fit when compared to the metric invariance model (Δcomparative fit index < .01). Overall, the results supported configural, metric, and scalar invariance for the three-factor model, indicating that the factor structure of the MEAMVS measure was consistent across male and female participants.

Discussion

This study tested the dimensionality and measurement invariance of a researcher-developed instrument, the MEAMVS, that was designed to measure both the amount of exposure (e.g., Time Consuming AMV-Related Media subscale) and the emotional reactions to the events (e.g., Anxious Emotions and Other Negative Emotions subscales) resulting from exposure to media coverage of AMV. The development and validation of a tool that could be used consistently across studies examining the effects of media exposure to various AMV events is an important contribution to research and public health response, given increased attention and focus on how media exposure to AMV affects physical and mental health (Ahern et al., 2004; Busso et al., 2014; Gershoff et al., 2010; Goodwin et al., 2018; Holman et al., 2014; Pfefferbaum et al., 2003).

Table 3
Invariance Summary of Fit Statistics Across Participant Sex

Model	χ^2	*df*	$\Delta\chi^2$	Δ*df*	SRMR	RMSEA [90% CI]	CFI	ΔCFI
Three-factor CFA	30.799 ($p < .05$)	17	—	—	.043	.051 [.020, .080]	.989	—
Single-group solutions								
Overall	100.434 ($p < .001$)	17	—	—	.038	.072 [.059, .086]	.976	—
Female ($n = 706$)	76.689 ($p < .001$)	17	—	—	.038	.071 [.055, .087]	.976	—
Male ($n = 226$)	46.743 ($p < .001$)	17	—	—	.049	.088 [.058, .119]	.967	—
Measurement invariance								
Configural	123.432 ($p < .001$)	34	—	—	.041	.075 [.061, .090]	.974	—
Metric	125.708 ($p < .001$)	39	2.276	5	.041	.069 [.056, .083]	.975	.001
Scalar	144.150 ($p < .001$)	44	18.442	5	.045	.070 [.057, .083]	.971	.004

Note. CFA = confirmatory factor analysis; SRMR = standardized root mean square residual; RMSEA = root mean square error of approximation; CI = confidence interval; CFI = comparative fit index.

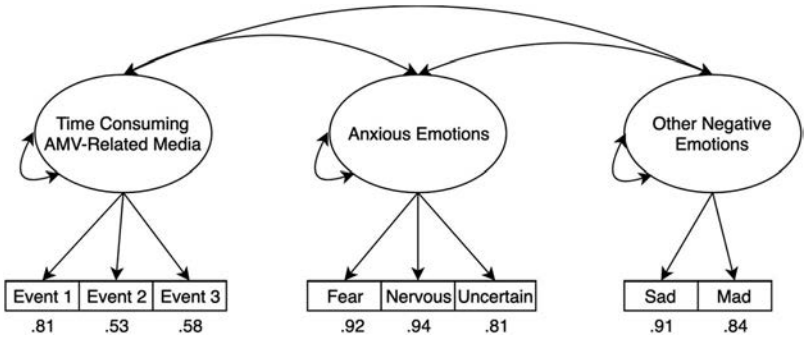

Figure 1. Standardized parameter estimates and factor loadings for the Media Exposure to Acute Mass Violence Scale. AMV = acute mass violence.

The results of this study provide preliminary evidence supporting the psychometric functioning of the MEAMVS, suggesting that it has the potential for consistent use in research studies across AMV events and could potentially provide a framework for future studies examining the effects these events have on various subpopulations. In addition, the results of this study demonstrated that the factor structure of the MEAMVS was invariant across male and female participants, demonstrating that the items and scales functioned consistently across sex. Establishing measurement invariance is particularly important for measures used in research that either makes direct comparisons or attempts to identify differences in how people from various backgrounds are functioning on the target traits or constructs (Borsboom, 2006; Milfont & Fischer, 2010). Reviews of research on survivors who directly experienced AMV suggest that there may be a gender difference in mental health outcomes (Lowe & Galea, 2017; Shultz et al., 2014). However, research on exposure to political violence hypothesized sex differences in reactions to the violence and mental health outcomes, but did not find sex as a moderator (Dubow et al., 2010). Sex has also been used as a control variable in research on media exposure to terror attacks (Goodwin et al., 2018), thus understanding that a measure works the same across sex can help in interpreting sex similarities and differences using the measure.

Our CFA supported a three-factor structure, Time-Consuming AMV-Related Media, Anxious Emotions Reaction, and Other Negative Emotions. Cultivation theory suggests that media is one of our most influential storytellers, and it shapes our attitudes, beliefs, and values; thus, cultivating our sense of reality (Morgan & Shanahan, 1997). The theory proposes that it is the overall amount of exposure that matters (Morgan & Shanahan, 1997), hence why Time-Consuming AMV-Related Media is crucial to measure in research. Indeed, most of the media exposure to AMV asks about time spent viewing media coverage (e.g., Goodwin et al., 2018; Holman et al., 2014; Silver et al., 2013). Due to several AMV incidents in one month, we asked about three different events in this subscale. Interestingly, we see that salience of the event can have an impact on factor loadings. Some events contributed more to the subscale Time Consuming AMV-Related Media than others, which is likely due to the size of the event and the amount of media coverage. In this study, the event that had the most media coverage and that persisted the longest was the Orlando nightclub mass shooting, and it had the highest factor loading. This has implications for researchers, for if they only pick one event, factors around its salience should be considered, if there is to be a relation to psychosocial adjustment. Whereas for those researchers interested in chronic media exposure, all the events in a predetermined time period may want to be included.

However, it is not just time viewing, but potential differences in emotional reactions to the coverage, that may play an important role in understanding the diverse mental health outcomes in the population, following media exposure to AMV (Pfefferbaum et al., 2003). Consequently, we measure the emotional reactions to the coverage as well. The five emotions we assessed represent anxious and other negative emotions, and we are piloting additional emotional reactions to further discern the role of emotions. We asked about a variety of emotions and they split into two separate scales. For some participants, the event produced high ratings of anxiety and uncertainty. For others, it was more likely to create feelings of sadness or anger. The initial emotions an event engenders may have different relations to subsequent psychosocial adjustment, and should be explored.

Limitations and Future Directions

The MEAMVS is a potential step forward in consistently and comprehensively measuring the factors that may account for the relation between media exposure to AMV and mental and physical health in the general population. In addition to the three subscales that were supported by the CFA, we asked other questions that may be important to consider for future research. Given that at times, there is repeated media coverage of several AMV events, our team started considering the possibility that just general time watching news and on social media could mean that people are repeatedly exposed to this type of content. Hence, we asked questions about general time consuming different types of media that can be used as a sum variable, to control for heavy users of media, and/or to see how time viewing specific coverage of AMV affects mental health over and above general time consuming media. Related to this, we started piloting a question on how much attention a person may pay to AMV-related media coverage, so that it can be used as a control for passive consumption (e.g., TV on in the background while doing other things). We offer these items in Table 1 for future research.

One limitation to our measure is that the Other Negative Emotions scale has only two items, which is not ideal. In an earlier study we discovered that different emotional reactions were related

to different parenting behaviors, which led to the creation and testing of an Other Negative Emotions scale. To better understand how emotional reactions to these events may differentially impact psychosocial adjustment, we are now piloting additional emotional reactions in response to AMV.

Although we found our measure performed equally well with males and females, future research may want to explore the role of race/ethnicity or other demographic characteristics. This can be complicated, as it can depend on contextual factors surrounding any given incident of AMV that can affect how individuals from different demographic groups may react, especially if the incident is targeting a group (such as a church shooting that targeted African Americans, a synagogue shooting targeting the Jewish community, or the demographic background of the perpetrator). Indeed, in a study following a mass murder tragedy that affected a university community, we found that female students had stronger negative reactions to media coverage than the male students (Felix, Moore, Meskunas, & Terzieva, 2017). This was understandable as the perpetrator left behind a misogynistic manifesto and expressed a desire to take revenge against women, and thus should not be generalized to all mass violence events. Hence, this is one reason why it is important to know that the measure works the same across sex, so that when sex differences due occur, they can be interpreted as due to the context of the event or another reason, and not measurement error.

Another limitation with any self-report measure is participant recall and ability to report accurately—in this instance, the ability of participants to recall time spent viewing media coverage. This is a methodological constraint affecting all media exposure research using self-report. An alternative method that researchers should consider is gathering data directly from smartphones on time spent on certain apps, or from social media sites directly. This can be used in conjunction with self-report to validate the accuracy of participants' self-report.

We developed this measure with the assumption that it was the total time consuming media coverage of AMV that was critical to different psychosocial and health outcomes. Hence, our items do not ask individually about each source of coverage (e.g., one item on radio, one on print news coverage, one on TV, one on social media, etc.). Another consideration was participant fatigue. At the time of developing the MEAMVS, there were several high profile AMV events in a single month. Our team has noticed that this is occurring more often than not. So researchers may be asking about multiple events because of their sheer time proximity, and thus, asking source information for every event adds to participant burden and may affect attrition or noncompletion rates for surveys. However, we recognize some researchers may have hypotheses about the differential impact of one source of information over another, or the usefulness of different sources of information. If so, we invite those researchers to modify our item stems to ask about each individual source of information.

Finally, in our measure of time, we chose to use the response options of Silver et al. (2013). Other researchers have used an open-ended item where participants write the number of hours per day or per week (e.g., Goodwin et al., 2018). When we have done open-ended responses, sometimes we get some implausible or unlikely responses, such as 25 hr per day, or even 20 hr per day. Hence, we decided that the categorization that Silver et al. (2013) used would be ideal, but others may want a more continuous measure for dose-response purposes.

Conclusions

In sum, the current study provides preliminary evidence supporting the content and structure of the MEAMVS as a measure of media exposure to AMV. In addition, this study provided preliminary evidence supporting the invariance of the MEAMVS across male and female participants, suggesting it is appropriate to make direct comparisons across sex using this tool. Although the results from this study generally supported the psychometric functioning of the MEAMVS, additional research is needed to examine how the tool functions across additional AMV events and also whether the factor structure of the tool is invariant across other subpopulations. With improved consistency in measurement of media exposure to AMV, our collective research can improve its ability to inform public health response and recommendations to support well-being.

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