

Chapter 2

The Content-based Media Exposure Scale (C-ME): Development and Validation

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Abstract

It is somewhat ironic that although youth today are saturated in media, no standardized instrument exists to measure individual differences in exposure to specific media content. Therefore, we developed and validated a scale to measure both the frequency and content of adolescents' media exposure, which measures media exposure regardless of media channel: the Content-based Media Exposure Scale (C-ME). The C-ME includes 17 items that assess exposure to antisocial (8 items) and neutral (9 items) media content. The factor structure was investigated in three independent samples ($N=892$, $N=748$, $N=524$). Model fit indices like CFA's and RMSEA showed good fit, for both types of content, and predictive and discriminant validity was assessed. Exposure to antisocial media content positively correlated with sensation seeking, trait aggressiveness, violent media use, and general media use. The C-ME proves a reliable and easy to use instrument that measures media exposure in today's (new) media landscape.

Keywords:

media use, new media, scale development, violent/antisocial media content, adolescents, sensation seeking, trait aggressiveness



The Content-based Media Exposure Scale (C-ME): Development and validation

Adolescents today live in a media-saturated world, like fish in water. Indeed, in surveys asking people “what things they can’t live without,” the Internet is ranked very high, ahead of clean drinking water and toilets in some surveys.¹ Media is no longer only consumed through traditional channels (such as television, newspaper or radio), but throughout various (new) media channels. Adolescents are especially heavy media consumers—they spend on average over 7 hours a day consuming both traditional media (e.g., television) and new media (e.g., video games, social media, YouTube) (Rideout et al., 2010). Media depicting antisocial behavior (e.g., fighting, destroying someone else’s property, reckless driving) seems highly popular among subgroups of adolescents (Strasburger, 2009; Strasburger et al., 2010).

Given the central role media has in the lives of many adolescents, it is somewhat ironic that there is no standardized measure for assessing individual differences in the content of media consumed. Problems and inconsistencies exist in accurately measuring media use (Jordan, Trentacoste, Henderson, Manganello, & Fishbein, 2007; Lee, Hornik, & Hennessy, 2008). Furthermore, most media exposure measures just ask for frequency of exposure to a particular medium (e.g., watching TV or playing video games) without discerning the specific content to which one has been exposed. Obviously, it is important to (1) measure media exposure based on content given today’s new media technology, and (2) to apply a solid measurement device that will make studies comparable. Therefore, we developed a measurement device to assess content-based media exposure. In doing so, we focused on adolescents and specifically on antisocial and risk behavior content as portrayed in the media because adolescents appear most susceptible to negative media influences (e.g., Brown & Witherspoon, 2002; Dahl & Hariri, 2005; Nije Bijvank, Konijn, & Bushman, 2012; Parkes, Wight, Hunt, Henderson, & Sargent, 2013; Strasburger et al., 2010). Since today’s media landscape does not differentiate anymore between specific media channels, our aim is to develop a reliable and easy to use measurement device that measures media exposure based on content given today’s wide availability of new media technology through which any type of content is available anytime, anywhere.

¹ <http://boards.collectors-society.com/ubbthreads.php?ubb=showflat&Number=5081107>

Measuring Media Exposure

Despite the vast amount of research on media-effects, there is no consensus on the best way to accurately measure media exposure, especially for adolescents (Jordan et al., 2007; Lee et al., 2008) and scholars have argued to overcome this lack in knowledge on how best to measure media exposure (Fishbein & Hornik, 2008). This urge has become more acute today with the rapidly changing media environments, the multiplied number of media channels, and an enormous increase in the amount of media messages. Many measurement devices focus on the frequency of media use (e.g., the general media exposure measurement used by Rideout et al., 2010), without addressing the content of the media. This is especially problematic given substantial individual differences among adolescents in preferences for specific media content, which may well be linked to differences in personality traits. Accordingly, the importance of measuring not only frequency, but rather media content is stressed by many (e.g., Annenberg Media Exposure Research Group, 2008; Bleakley et al., 2008; Lee et al., 2008; Sargent, Worth, Beach, Gerrard, & Heatherton, 2008) and corresponds with the recommendation of Slater (2004). Lee et al. (2008) compared several general media exposure measures that focused on frequency of media use. They concluded that these general measures perform only moderately in terms of their reliability, especially when measuring media exposure of youth (aged 9-18). Reliability coefficients of the six compared general media use measures were only between .54 and .66, which is clearly not reliable enough to provide solid insights and limits usefulness for subsequent analyses, for example to relate the level of media exposure to other variables. Measures that do focus on content, like diaries and cued recall measures are time-consuming and result in difficulties in forming a consistent measurement device that can be used to compare different samples or different countries (Annenberg Media Exposure Research Group, 2008; Coyne & Archer, 2005; Coyne, Nelson, Graham-Kevan, Keister, & Grant, 2010; Roberts & Foehr, 2004; Sargent et al., 2008). In addition, common measures for media use are often limited in addressing only one or a few specific media formats, such as watching TV or playing video games. An adequate measurement scale should capture both the frequency and the content of media exposure, in a systematic and uniform way (Jordan et al., 2007). This is in line with the recommendation of both Bleakley et al. (2008) and the Annenberg Media Exposure Research Group (2008) to weight content exposure by the frequency of the exposure. Therefore, we decided to develop a measurement device in which both

frequency and content of media use are measured in a systematic and uniform way.

The relevance of developing such a measurement device is emphasized by the numerous studies on media use and the omnipresence of media in today's society. Examples of findings in adolescent media-based studies are the association between exposure to media characters drinking alcohol, smoking, and taking drugs and the willingness of adolescents to engage in those behaviors (Dal Cin et al., 2012; Denniston, Swahn, Hertz, & Romero, 2011; Wills, Sargent, Gibbons, Gerrard, & Stoolmiller, 2009), the association of exposure to violent media and aggressive behaviors (e.g., Anderson et al., 2010; Den Hamer et al., 2014; Huesmann, Moise-Titus, Podolski, & Eron, 2003; Konijn, Nije Bijvank, & Bushman, 2007; Linder & Gentile, 2009; Wallenius & Punamäki, 2008), and the association between sexual media content and sexual behavior in early adolescence (e.g., Brown et al., 2006; Chandra et al., 2008; Greenfield, 2004; Parkes et al., 2013; Peter & Valkenburg, 2008). A uniform measurement device, which deals with various categories of media content, can therefore aid in comparisons across studies.

Because the lives of adolescents are media-saturated these days, measuring their media use of a single medium (e.g., television) is not sufficient anymore; other media should also be taken into account (Internet, games, etc.) (Bleakley et al., 2008; Konijn, Veldhuis, & Plaisier, 2013). Indeed, most adolescents multi-task by consuming more than one type of media at a time, such as texting while watching television (Rideout et al., 2010). For this reason, it is important to measure the *content* of adolescents' media use instead of only measuring their use of a particular medium. Our measurement device is content-based and independent of the medium, in line with the recommendation by Bleakley et al. (2008) to use a multiple media measure instead of media-specific measures.

The Content-Based Media Exposure Scale: The C-ME Scale

The components of the C-ME scale are based on previous research and monitors several categories of antisocial and risk behavior as commonly portrayed in today's media fare targeted at adolescents: alcohol and substance abuse, aggressiveness, bullying, violent, sexually explicit, and deviant behaviors (e.g., stealing and destroying someone else's belonging). These categories were derived from research in media violence and in adolescent risk behavior (e.g., Brener et al., 2002; Brown & Witherspoon, 2002). We included a variety of risky behaviors, not just the antisocial ones. For example, we included media

with sexual content (people having sex or people openly talking about sex), because research showed that, among adolescents, exposure to sexual media content leads to greater intentions to engage in early sexual intercourse and more sexual activity (Brown et al., 2006; L'Engle, Brown, & Kenneavy, 2006). Research has shown that early sexual experience can have negative health and social outcomes (e.g., O'Donnell, Myint-U, O'Donnell, & Stueve, 2003; Parkes et al., 2013).

The C-ME contains an antisocial factor, which is expected to relate to several individual differences in personality traits, including sensation seeking, and trait aggressiveness. Previous research showed that risk-glorifying media increases sensation seeking (Fischer et al., 2009; Hoffner & Levine, 2005). Further, both violent media (Slater et al., 2003) and R-rated movies for viewers 17 and older (Stoolmiller, Gerrard, Sargent, Worth, & Gibbons, 2010) are associated with increases in sensation seeking. An association is expected between the antisocial factor of the C-ME and trait aggressiveness because individuals high in trait aggressiveness are more attracted to violent media content (Krcmar & Greene, 1999; Slater et al., 2003).

Finally, an association between exposure to media with antisocial content and participant sex is expected because research has shown that boys are more attracted to violent media than are girls (Ferguson, Olson, Kutner, & Warner, 2010; Möller, Krahe, Busching, & Krause, 2011). Moreover, exposure to violent media is greater for boys than for girls (Funk, Baldacci, Pasold, & Baumgardner, 2004; Kirsch, 2006; Möller et al., 2011; Sigurdsson, Gudjonsson, Bragason, Kristjansdottir, & Sigfusdottir, 2006). These individual differences were compared with the C-ME.

Overview Current Study

This article reports on three studies involving over 2000 adolescents, aimed at the development and validation of the Content-based Media Exposure (C-ME) scale (Appendix at the end of this chapter). The purpose of Study 1 was to generate items to reflect antisocial media content and to confirm the underlying factor structure of the items. Study 2 investigates whether the factor structure remains intact in a different sample, and examines the predictive and discriminant validity of the scale by analyzing the relationships with individual-differences variables. And Study 3 uses a sample of boys to test whether the factor structure is sensitive to participant sex and replicates the predictive and discriminant analyses.

Study 1

Method

Participants. Participants were 892 adolescents aged 11 to 18 years old ($M_{age}=13.73$, $SD_{age}=1.36$; 57% boys), randomly selected from secondary schools throughout the country. Participants were representative in terms of educational ability, socio-economic status, race, and ethnicity. Parental passive consent rate was 100%; no students refused to participate in the study due to a class-wise procedure.

Procedure. Data were collected in schools using a paper-pencil questionnaire. Participants completed the C-ME scale independently. The scale contained 14 items that covered five categories of antisocial media content (i.e., alcohol use, drug use, aggression and violence, sex, and other deviant behaviors such as stealing), along with some neutral filler items. All items were answered using a 5-point scale (1=*never* to 5=*very often*). Responses were anonymous. A debriefing followed.

Results

In Study 1 (and subsequent studies), missing data were handled using hotdeck imputation (Myers, 2011). Data were analyzed using exploratory factor analysis (EFA). Following the recommendations of Morrison (2009), the initial 14 C-ME items were subjected to principal components factor analysis with promax rotation. The factor structure was assessed using Bartlett's Test of Sphericity and the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy. The number of factors to be retained was determined by Parallel Analysis (using the program Monte Carlo PCA for Parallel Analysis of Watkins, 2000).

The analysis retained four factors that explained 31.0%, 14.0%, 8.9%, and 7.8% of the variance (total = 61.6%). Bartlett's Test of Sphericity was significant ($p < .01$), and the Kaiser-Meyer-Olkin measure of sampling adequacy was .83, exceeding the recommended value of .60 (Kaiser, 1974). Factors 1 and 2 contained antisocial content items, whereas factors 3 and 4 contained neutral and prosocial items, respectively (Table 1). The two factors containing antisocial media content were correlated .66, with one item ("using drugs") cross-loading on both factors. The two other factors had several cross-loadings, but were correlated only -.02. The neutral item concerning "music videos" was removed because it loaded highly on the antisocial factor, perhaps because many music

Table 1. Item loadings and descriptive statistics for antisocial and neutral/prosocial items based on EFA in Study 1

“How often do you watch, on the Internet/TV/ games/mobile phone/DVD, people who...” (preceding antisocial items)	Media with antisocial content (1)	Media with antisocial content (2)	Media with prosocial content (1)	Media with neutral content (2)
... shoot at another person?	.93	-.16	-.09	.09
... fight?	.77	-.06	-.10	.13
... destroy someone else’s belongings?	.74	.04	.01	-.07
... steal?	.59	.13	.15	-.10
... use drugs?	.40	.30	.16	-.11
... openly talk about sex?	-.14	.90	-.05	.03
... are having sex?	.16	.57	-.15	.10
... drink (a lot of) alcohol?	.31	.49	.10	-.05
... watch music videos?	-.04	.39	-.04	.21
... help someone?	-.06	-.07	.80	.06
... stand up for someone?	.05	-.02	.75	.04
... watch sports?	.12	.18	.00	.55
... watch the news?	-.04	-.05	.34	.34
... watch a family quiz?	-.08	.06	.20	.29
Percentage of variance accounted for	30.9%	14.0%	8.9%	7.8%
Eigenvalue	4.33	1.96	1.24	1.10
Total Cronbach alpha	.87		.42	
Total Mean (SD)	2.42 (.78)		3.24 (.67)	

Note. Factor loadings in bold are considered high on the factor.

videos that are popular among adolescents refer to violence and sex. Because the factor containing neutral items was not internally consistent (Table 1), several new neutral items were added for Study 2.

Study 2

The purpose of Study 2 was to select more neutral filler items for the C-ME to create a more balanced scale, and to also test whether the C-ME is related to individual differences (i.e., sensation seeking, trait aggressiveness, participant sex) in predictable ways.

Method

Participants. Participants were 748 adolescents ($M_{age}=13.62$, $SD_{age}=1.07$; 49% boys) that were selected from various secondary schools throughout the country, independent from Study 1. Parental consent rate was 100%; and again, no students refused to participate in the study, thanks to the schools' support.

Procedure. The procedure was the same as for Study 1. However, several new items about neutral content were added (e.g., "shows about travelling", "cooking shows"), resulting in a 17-item questionnaire (8 antisocial and 9 neutral filler items). Participants also completed measures of sensation seeking, and trait aggressiveness. Sensation seeking was measured using two items from previous research (e.g., "I like to do risky things, even if they are dangerous"; Slater et al., 2003), plus three additional items (e.g., "I wish my life was more exciting"; Cronbach $\alpha=.77$; $M=2.57$, $SD=0.91$). Trait aggressiveness was measured using the 9-item physical aggression subscale of the Aggression Questionnaire (Buss & Perry, 1992; e.g., "I get into fights a little more than the average person"; Cronbach $\alpha=.86$; $M=2.19$, $SD=0.84$). All items were scored using a 5-point scale (1=*never* to 5=*very often*). A debriefing followed.

Results

Model fit and reliability. Data were analyzed using confirmatory factor analysis (CFA) with maximum-likelihood extraction (WLSMV). Analyses were performed using Mplus (6.12) with polychoric or categorical variables. We report the following fit indices: the Chi-Square test statistic with corresponding degrees of freedom and level of significance, the comparative fit index (CFI), the Tucker Lewis index (TLI), and the Root Mean Squared Error of Approximation (RMSEA) with its corresponding 90% confidence interval. A good model fit is indicated by a CFI and TLI of .95 or higher, and an RMSEA of .06 or lower (RMSEA $<.10$ indicates adequate fit; Chen, 2007; Cheung & Rensvold, 2002; Hu & Bentler, 1999; Kelloway, 1998). Although a non-significant Chi-Square indicates a good fit, with large sample sizes the Chi-Square is often significant and not very useful (Hu & Bentler, 1999).

As expected, boys were heavier users of antisocial media content ($M=2.49$, $SD=0.82$) than were girls ($M=1.90$, $SD=0.71$), $r=-.36$, $p<.001$. Thus, subsequent analyses included participant sex in the model. A CFA with participant sex as the multi-group factor was conducted on the 8 antisocial media items. Because boys and girls had different variances on various items, the thresholds of some

items were unconstrained (e.g., "fighting"). Moreover, the error variances of several items were allowed to correlate (i.e., "drugs" with "alcohol", and "shooting" with "fighting"). The model showed a good fit, CFI=.99, TLI=.99, RMSEA=.06 (90% CI: .05-.07). As expected, the Chi-Square test was significant because the sample size was quite large, $\chi^2(57, N=748)=139.24$ ($\chi^2_{\text{boys}}=85.91$, $\chi^2_{\text{girls}}=53.33$), $p<.001$. A second CFA was conducted that added the 9 filler items as a second factor. The fit of the model remained adequate: CFI=.93, TLI=.93, RMSEA=.09 (90% CI: .08-.09), $\chi^2(df = 272)=1020.73$ ($\chi^2_{\text{boys}}=492.32$, $\chi^2_{\text{girls}}=528.41$), $p<.001$.

Both the antisocial media content factor and the neutral content factor were found to be internally consistent (antisocial: Cronbach $\alpha=.89$; $M=2.19$, $SD=0.82$; neutral: Cronbach $\alpha=.72$; $M=2.57$, $SD=0.62$; total: Cronbach $\alpha=.77$; $M=2.39$, $SD=0.51$). Boys were more exposed to antisocial media content ($M=2.49$, $SD=.82$) than were girls ($M=1.90$, $SD=.71$; $t(738)=10.47$, $p<.01$).

Predictive and discriminant validity of antisocial media content. Antisocial media exposure was expected to correlate positively with sensation seeking and trait aggressiveness. Predictive and discriminant analyses of the antisocial factor of the C-ME and individual-differences variables were assessed using Structural Equation Modeling (following Hayes, Glynn, & Shanahan, 2005). The predictive validity of the antisocial media content factor was examined in a latent variable measurement model, via the correlations between scores on the antisocial media content factor and other individual differences. For each individual-differences variable, a 2-factor measurement model was specified with two factors: (1) antisocial media content, and (2) individual differences. The indicators (i.e., items) were only allowed to load on their respective latent variables; cross-loadings were not allowed. To establish discriminant validity, a 1-factor measurement model was specified where both antisocial media content and the variable of individual-differences were constrained to load on one factor. The 1- and 2-factor models were statistically compared using χ^2 -difference tests, as well as fit indices. When the 2-factor model showed a better fit than the 1-factor model, this indicated the discriminant validity of the scale. The predictive and discriminant validity of the neutral media content factor was assessed in the same manner.

As expected, sensation seeking was positively correlated with exposure to antisocial media for both boys ($r=.33$, $p<.001$) and girls ($r=.46$, $p<.001$). The 2-factor model provided a significantly better fit to the data than did the 1-factor model (Table 2).

As expected, trait aggressiveness was positively correlated with exposure to antisocial media for both boys ($r=.43, p<.001$) and girls ($r=.41, p<.001$), and the 2-factor model fitted the data better than the 1-factor model (Table 2). These results show the predictive and discriminant validity of the C-ME.

Table 2. Predictive and discriminant validity of the Content-based Media Exposure scale in Study 2

Variable			Single factor model	Two factor model	Improvement in fit from single to two factor model
		<i>Correlation with antisocial media content</i>	$\chi^2(df)$	$\chi^2(df)$	$\Delta\chi^2(df)$
			CFI	CFI	ΔCFI
			TLI	TLI	ΔTLI
			RMSEA	RMSEA	$\Delta RMSEA$
Sensation seeking (Cronbach $\alpha = .77, N = 998$)	Boys	.33***	1136.90 (169)	374.77 (165)	-762.13 (4)
	Girls	.46***	788.59 (169)	263.64 (165)	-524.95 (4)
			.83	.96	.13
			.85	.96	.12
			.14	.08	-.06
Trait aggression (Cronbach $\alpha = .86, N = 975$)	Boys	.43***	1323.19 (288)	452.97 (284)	-234.77 (4)
	Girls	.41***	1308.90 (288)	378.73 (284)	-324.05 (4)
			.81	.96	.15
			.82	.96	.14
			.13	.06	-.07

*** $p < .001$

Note. Cronbach α is the internal consistency reliability estimate for measurement of the construct in that row.

CFI = Confirmatory fit index. TLI = Tucker Lewis index. RMSEA = Root mean squared error of approximation.

All changes in χ^2 are statistically significant at $p < .01$.

Study 3

The main purpose of Study 3 was to replicate the findings of Study 2 using a sample of boys, since they are most attracted to violent and antisocial media content. Study 3 also compares the C-ME to one of the most frequently used measures of violent media exposure, and one of the most popular measures of general media exposure.

Method

Participants. Participants were a separate sample of 524 adolescent boys ($M_{age}=14.10$, $SD_{age}=1.58$) who were randomly selected from various secondary schools throughout the country. Parental consent rate was 100%; participant assent rate was 100%.

Procedure. The procedure was the same as in Study 2, except that we added a measure of violent media exposure and a measure of general media exposure. A common measure of violent media exposure was used (e.g., Anderson & Dill, 2000; Gentile, Coyne, & Walsh, 2011; Ostrov, Gentile, & Crick, 2006; Swing & Anderson, 2014). Participants listed their three favorite television programs, films, and video games, rated how often they watched or played it (1=*Almost never* to 5=*Almost every day*), and rated how violent it is (1=*Not at all violent* to 4=*Very violent*). Thus, scores range from 1 to 20. We multiplied violence scores by frequency scores to obtain an overall measure of exposure to media violence (Cronbach $\alpha=.77$; $M=8.92$, $SD=3.20$).

The measurement used for general media use asked participants to indicate how often they watch television, during a normal weekday and during a normal weekend (1=*less than 1 hour*, 2=*between 1 and 2 hours*, 3=*between 2 and 4 hours*, 4=*more than 4 hours*; Jordan et al., 2007). Participants were asked the same questions for new media use (e.g., YouTube, video games, social network sites, surfing the web). Participants also indicated how many movies they generally watched per week (1=*0 movies*, 2=*less than 2 movies*, 3=*2–5 movies*, 4=*more than 5 movies*). Scores ranged from 1 to 16. Per medium, week, and weekend, scores were multiplied and averaged to obtain an overall measure of media use (Cronbach $\alpha=.70$; $M=6.38$, $SD=2.84$). This type of global time measurement has also been used by the Kaiser Family Foundation (Rideout et al., 2010).

Sensation seeking and trait aggressiveness measures each had a good reliability (sensation seeking: Cronbach α =.84; M =2.60, SD =0.78; trait aggressiveness: Cronbach α =.87; M =3.06, SD =0.82).

Results

CFA of media with antisocial content. A CFA tested whether the factor structure of antisocial media content remained the same in an all-boy sample. The error variances of several items were allowed to correlate (i.e., “drugs” with “alcohol”,). The model again showed an adequate fit, CFI=.98, TLI=.97, RMSEA=.09 (90% CI: .08-.11), $\chi^2(17, N=524)=93.98, p<.001$. A second CFA that added the 9 neutral items also showed an adequate fit: CFI=.93, TLI=.91, RMSEA=.08 (90% CI: .07-.08), $\chi^2(115, N=524)=471.33, p<.001$. As in Study 2, the antisocial items were internally consistent (Cronbach α =.85; M =2.79, SD =0.81), as were the neutral items (Cronbach α =.75; M =2.59, SD =0.61; total scale: Cronbach α =.80; M =2.68, SD =0.55).

Predictive and discriminant validity. Again, the 2-factor models of sensation seeking and trait aggressiveness had a better fit than the 1-factor models ($r_{sensation}=.40, p<.001, r_{aggressiveness}=.46, p<.001$; fit indices in Table 3).

Correlation with violent media exposure measure. As expected, the violent media exposure measure positively correlated with the antisocial factor of the C-ME ($r=.44, p<.001$). The 2-factor model that included the two separate scales (antisocial media and violent media) fit the data better than the 1-factor model that combined them (Table 3). Thus, the measure of exposure to antisocial media content adds unique variance compared to exposure to only violent media.

Correlation with general media exposure measure. As expected, the general media exposure measure was positively correlated with the antisocial factor of the C-ME ($r=.47, p<.001$). And, as was the case with violent media exposure, the 2-factor model was significantly better than the 1-factor model (Table 3). Thus, measuring exposure to antisocial media content also adds unique variance compared to exposure to media in general.

Linear regression analysis showed that the C-ME was more strongly associated with trait aggressiveness ($\beta=.36, r^2=.13$) than either violent media exposure ($\beta=.25, r^2=.06$) or general media exposure ($\beta=.23, r^2=.05$). Thus,

Table 3. Predictive and discriminant validity of the Content-based Media Exposure scale in Study 3 (all boy-sample)

Variable		Single factor model	Two factor model	Improvement in fit from single to two factor model
	<i>Correlation with antisocial media content</i>	$\chi^2(df)$	$\chi^2(df)$	$\Delta\chi^2(df)$
		CFI	CFI	ΔCFI
		TLI	TLI	ΔTLI
Sensation seeking (Cronbach $\alpha = .84, N = 488$)	.40***	RMSEA	RMSEA	$\Delta RMSEA$
		.81	.98	.17
		.76	.98	.22
		.20	.06	-.14
Trait aggressiveness (Cronbach $\alpha = .87, N = 450$)	.46***	1497.01 (116)	280.44 (115)	-1288.57 (1)
		.77	.97	.20
		.74	.97	.23
		.15	.05	-.10
Violent media (Cronbach $\alpha = .77, N = 434$)	.44***	740.38 (116)	408.18 (115)	-332.20 (1)
		.82	.92	.10
		.79	.90	.11
		.10	.07	-.03
General media use (Cronbach $\alpha = .70, N = 522$)	.47***	514.71 (74)	261.57 (73)	-253.14 (1)
		.88	.95	.07
		.85	.94	.09
		.11	.07	-.04

*** $p < .001$

Note: Cronbach α is the internal consistency reliability estimate for measurement of the construct in that row.

CFI = Confirmatory fit index. TLI = Tucker Lewis index. RMSEA = Root mean squared error of approximation.

All changes in χ^2 are statistically significant at $p < .01$.

Table 4. Overview of reliability and model fit for the C-ME scale in four samples

Study 1. Adolescent sample. N = 892	Descriptive statistics	
Antisocial media content (8 items)	Cronbach $\alpha = .87$; $M = 2.42, SD = .78$.	
Neutral filler items (4 items)	Cronbach $\alpha = .42$; $M = 3.24, SD = .67$.	
Antisocial items and neutral filler items (12 items)	Cronbach $\alpha = .75$; $M = 2.78, SD = .53$.	
Study 2. Adolescent sample. N = 748	Descriptive statistics	Fit indices
Antisocial media content (8 items)	Cronbach $\alpha = .89$; $M = 2.19, SD = .82$.	CFI = .99, TLI = .99, RMSEA = .06 (90% CI: .05 - .07), $\chi^2 (57, N = 748) = 139.24$ (χ^2 boys = 85.91, χ^2 girls = 53.33), $p < .001$.
Neutral filler items (9 items)	Cronbach $\alpha = .72$; $M = 2.57, SD = .62$.	
Antisocial items and neutral filler items (17 items)	Cronbach $\alpha = .77$; $M = 2.39, SD = .51$.	CFI = .93, TLI = .93, RMSEA = .09 (90% CI: .08 - .09), $\chi^2 (df = 272) = 1020.73$ (χ^2 boys = 492.32, χ^2 girls = 528.41), $p < .001$.
Study 3. Adolescent all-boy sample. N = 524	Descriptive statistics	Fit indices
Antisocial media content (8 items)	Cronbach $\alpha = .85$; $M = 2.79, SD = .81$.	CFI = .98, TLI = .97, RMSEA = .09 (90% CI: .08 - .11), $\chi^2 (17, N = 524) = 93.98$, $p < .001$.
Neutral filler items (9 items)	Cronbach $\alpha = .75$; $M = 2.59, SD = .61$.	
Antisocial items and neutral filler items (17 items)	Cronbach $\alpha = .80$; $M = 2.68, SD = .55$.	CFI = .93, TLI = .91, RMSEA = .08 (90% CI: .07 - .08), $\chi^2 (115, N = 524) = 471.33$, $p < .001$.

although the C-ME is a measure of a broader category of exposure to antisocial media content (rather than simply violent media content), it is more strongly correlated with trait aggressiveness than the commonly used measure of violent media exposure. These results indicate that the C-ME is a reliable and valid scale for measuring the content of adolescents' media exposure. Table 4 contains descriptive statistics and fit indices for all three studies.

General Discussion

The purpose of this research was to construct and validate a measurement instrument that measures both the frequency and the content of adolescents' media exposure, regardless of how the media is consumed (e.g., via TV, Internet, DVD, games), and to examine associations between exposure to specific media content and individual differences in sensation seeking and trait aggressiveness among others. The Content-based Media Exposure (C-ME) Scale includes 8 items that measure the extent to which one exposes him-/herself to media with antisocial and risk behavior content, and 9 neutral filler items. Three studies, involving over 2000 participants, demonstrated the reliability and validity of the C-ME, consistent over the three studies. Differences in exposure to antisocial media content were found according to expectations: the results indicate that high levels of exposure to antisocial media content are related to trait aggressiveness and sensation seeking. Although measures of violent media use and general media use are commonly applied in predicting aggressive behavior, the antisocial factor of the C-ME showed a stronger association with trait aggressiveness than these measures. This finding suggests that measuring exposure to antisocial media content via the C-ME adds unique variance compared to exposure to media in general and exposure to violent media, and therefore is better able to elucidate associations between media use and individual differences in personality traits. Furthermore, previous research showed that the commonly used violent and general media exposure measures generally have poor to just sufficient reliabilities (Lee et al., 2008), whereas media exposure to antisocial and risk behavior content measured by the C-ME showed reliabilities beyond .85 across all studies.

The C-ME measures a wider array of antisocial and risk behavior content in popular media among adolescents than do the common media exposure measurements. Moreover, the C-ME measures such media exposure throughout various media channels instead of limited to one or a few media channels, like most currently available media exposure measurements (Bleakley et al., 2008). Another important feature of the C-ME is that it is very easy to apply in all sorts of studies relating to media use and effects (e.g., laboratory experiments, field experiments, surveys, longitudinal studies). The target population in the current study was adolescents, but the scale can also be applied to other age-groups. The C-ME measures media exposure based on content given today's wide availability of new media technology through which any type of content is

available anytime, anywhere. The C-ME scale proves a reliable and easy to use instrument which is important to include in various types of research among today's youth.

Although we extensively tested the C-ME, the present research does have some limitations. As is common in validation studies, we used correlations to assess the predictive validity of the C-ME. It should be noted, however, that correlations do not imply causality. Future research is needed to examine the C-ME for media exposure as a causal factor in individual differences. Furthermore, the C-ME is a self-report measure. Although some scholars argue that recognition-based measures such as self-report measures are imperfect indicators of media exposure (Southwell & Langteau, 2008), these authors also state that this particularly applies to older respondents (i.e., over 70 years old). In the current research, the C-ME mainly addressed adolescents, who are more able to encode and report media exposure than their older counterparts (Southwell & Langteau, 2008). Next, the C-ME measures the broad array of antisocial and risk behavior content in media exposure. However, this does not mean that the C-ME is applicable in any type of research. Dependent on the aim of a specific study, other content-specific measures could be more appropriate, for example, when a study focuses solely on sexual content, nudity, or romance. Finally, in the current studies, we measured media exposure as a momentary state whereas media use also develops over time. The C-ME is open to include time-indicators in the instructions (e.g., asking for media exposure in specific weeks) and can likewise be used for long-term and longitudinal purposes. In our most recent research (Den Hamer & Konijn, 2015), we applied the C-ME in a longitudinal design wherein media exposure is probed at subsequent time points throughout the academic year.

In all, the results of the three studies reported in this paper indicate that the Content-based Media Exposure scale (C-ME) is a valid, reliable, and easy to use measure of exposure to a broad array of antisocial and risk behavior content in the media, covering all media channels. Because media use has expanded enormously over the last decade, among adolescents in particular, it is advisable to include media use in contemporary research designs wherever it seems relevant to further understand individual, psychological or developmental differences. For example, recent research showed that exposure to antisocial media content amplified cyberbullying behavior (Den Hamer & Konijn, 2015; Den Hamer et al., 2014). The C-ME is highly appropriate and easy to apply in investigating the role of adolescent media use in risk

behavior, or in adolescents' development of empathy, moral reasoning, and social anxiety, among others. We hope that this measurement instrument will enable researchers interested in how media may affect behavior in a variety of ways, to include media exposure in any kind of research, from online surveys to laboratory experiments.

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Appendix: All items of the C-ME scale

Please report for every question how often you watch this type of content on TV/Internet/DVD. This could be clips on YouTube, music videos, quiz shows, television shows, in video games, in the cinema, etcetera. So, it does not matter where you watch it, but how often you watch it.

For each statement, you encircle one number.

	How often do you watch (on the Internet/TV/ games/mobile phone/DVD) ...	Never	Incidentally	Sometimes	Often	Very often
1	... people who fight?	1	2	3	4	5
2	... people who openly talk about sex?	1	2	3	4	5
3	... people who use drugs?	1	2	3	4	5
4	... people who destroy someone else's belongings?	1	2	3	4	5
5	... people who shoot at another person?	1	2	3	4	5
6	... people who drink a lot of alcohol?	1	2	3	4	5
7	... people who are having sex?	1	2	3	4	5
8	... people who steal?	1	2	3	4	5
9	... people who help someone?	1	2	3	4	5
10	... people who stand up for someone?	1	2	3	4	5
11	... a quiz?	1	2	3	4	5
12	... talk shows?	1	2	3	4	5
13	... shows where houses or cars get a makeover?	1	2	3	4	5
14	... shows about nature or animals?	1	2	3	4	5
15	... shows about travelling?	1	2	3	4	5
16	... cooking shows?	1	2	3	4	5
17	... the news?	1	2	3	4	5