Routledge
Taylor & Francis Group

The motivation activation measure and media use in Singapore: cross-cultural stability

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ABSTRACT

The purpose of this paper is twofold: First, it tests how the Motivation Activation Measure [MAM; Lang, A., Bradley, S. D., Sparks Jr, J. V., & Lee, S. (2007). The motivation activation measure (MAM): How well does MAM predict individual differences in physiological indicators of appetitive and aversive activation? *Communication Methods and Measures*, 1(2), 113–136] applies in a non-American (i.e. Asian) context, in order to provide evidence for the universality asserted through its theoretical underpinnings as an indicator of biologically based motivation systems. It thus investigates cross-cultural variation in the MAM scores and the associations with established measures of theoretically related personality factors. Second, the paper examines how individual differences in motivational system responsiveness correlate with media use and interests in an Asian culture. Eight hundred sixty-five respondents completed MAM, personality measures and self-reported media preference in an online survey. Findings indicate that the MAM values recorded in the Asian sample associate with the measures of theoretically related human traits as expected, and had a similar pattern of scores with those found in American samples. Moreover, results suggest that audience interests in different types of media can be predicted through their variation in motivation systems activation.

Introduction

Considering the needs, motives and gratifications of media audiences as the main point of research analysis, the uses-and-gratifications perspective (U&G; Katz, Blumler, & Gurevitch, 1974) theorizes on what 'people do with media' as opposed to what media do to them (i.e. media effects). According to this audience-centered approach, individuals seek out specific media programs and genres that gratify their needs (Katz et al., 1974). Although there has been a considerable amount of research on individual difference variation and media use, up until recently little attention was paid to the biological motivational substrates that generate the identified needs. Only one study examined the potential associations between the motivational systems and media use (Potter, Lee, &

Rubenking, 2011). In line with calls to integrate concepts of motivation and media use (Liu, 2015; McLeod & Becker, 1981), the current research constitutes a replication and extension of Potter et al. (2011), and represents an emerging trend in bridge building between biology, psychology and media research by examining the potency of motivational systems activation in predicting known patterns of media use in a non-American context.

Extensive psychological research has identified that human responses to incoming stimuli are a function of the underlying activation in two motivational systems: the aversive (also called defensive) and the appetitive (Bradley, Codispoti, Cuthbert, & Lang, 2001; Cacioppo & Gardner, 1999; Ito, Cacioppo, & Lang, 1998; Lang, Bradley, & Cuthbert, 1990). The functioning of these two systems has been theoretically and empirically linked to a wide range of behaviors (Brown, 1948; Cacioppo & Berntson, 1994; Fredrickson & Losada, 2005; Rozin & Royzman, 2001), including media use and effects (Bradley et al., 2001; Ito & Cacioppo, 2005; Lang, Bradley, Sparks Jr, & Lee, 2007; Potter et al., 2011).

A relatively recent measure called the Motivation Activation Measure (MAM; Lang et al., 2007; Lang, Wang, Kurita, Bradley, & Rubenking, 2009) has been developed based on this strong theoretical framework to identify biological-level differences in the appetitive system activation (ASA) and in the defensive system activation (DSA). As yet, all work in this area is based exclusively on American samples and MAM universality and cross-cultural applicability has not been explored. The current study administered MAM and measures of related key personality traits in a non-American (i.e. Asian) context to test whether the results from the United States of America would generalize to a different culture. The present study thus attempts to validate MAM as a universal measure of motivational systems activation by (1) first testing its relationship with theoretically related personality factors and (2) by further examining how variation in motivation systems responsiveness is associated with known patterns of media use in an Asian context.

Motivational systems activation and MAM

One of the first conceptual models to propose a role for motivational systems was offered by dimensional theories of emotion (Cacioppo & Gardner, 1999; Ito et al., 1998; Lang et al., 1990). The two-dimension theories of emotion posit that there are two basic motivational systems, which are conceived to be automatically activated by incoming emotional stimuli. There is evolutionary benefit to approach certain stimuli in the absence of danger (the appetitive motivation system), and there is also adaptive benefit for intense and immediate withdrawal or aversive responses when signals of danger appear (the defensive motivational system). The appetitive system is slightly more active by default as it sustains life through the motivation to approach things that may be beneficial (food and procreative opportunities) in a relatively safe, neutral environment.

While the motivational systems are typically activated by people's experience with incoming stimuli, different people have different thresholds, and thus greater or lesser propensity to respond in an appetitive or in an aversive manner. Such propensities constitute an enduring dispositional characteristic or trait that is of interest to theory-based research. Following the dimensional theory of emotion and using similar procedures to Ito et al. (1998), Lang et al. (2009) developed the MAM as an easy-to-administer indicator of

individual-level variation in the underlying trait motivational reactivity. It uses self-reported ratings of emotional experience in response to International Affective Picture System (IAPS) images (Lang, Bradley, & Cuthbert, 1999).

Studies in this area have consistently found MAM to be a valid and reliable indicator of individual variation in the reactivity of the appetitive and aversive systems (Lang et al., 2007; Lang, Kurita, Rubenking, & Potter, 2011; Lang, Shin, & Lee, 2005; Potter et al., 2011). This research on MAM has been validated and established in the United States of America. The aim of the study reported here is to test whether the results of the American studies replicate in an Asian sample, in order to examine its validity as a universal indicator of biological-level activation in motivational systems: ASA to index variation in the appetitive and DSA to index variation in the aversive system activation. It also aims to extend prior work on MAM by investigating variation in the MAM scores and associations with established measures of theoretically related personality factors as well as associations between motivational system responsiveness and media use and interests in a non-American setting.

Cross-cultural differences in emotional responding

The degree to which human emotions are essentially universal has been debated for centuries, and the scholarly discussion dates back to Darwin. More recently, Ekman (1992) has made a strong case for the universality of what he calls basic emotions, or those 'that evolved for their adaptive value in dealing with fundamental life tasks' (p. 171). To the extent that emotions guide human behaviors that help ensure the safety and well-being of the individual and support social organization, there is indeed a commonality across the species. At the biological or organismal level, emotions represent a basic component of human functioning and the neural substrates that give rise to them are thought to be roughly the same across all healthy humans. In addition to the biological aspects of emotion, research indicates that there are likely to be universal aspects to both the display and experience of emotion (Ekman, 1989, 1992; Mesquita & Fridja, 1992).

While a common neurological system is likely to give rise to emotions with little variance across individuals and groups, research has also documented cross-cultural differences. However, most studies focus on the valuation, interpretation or expression of emotion, and not the visceral experience of it. For example, research by Tsai, Knutson And Fung (2006) revealed that Asian-Americans and European-Americans value excitement more than Hong Kong Chinese. Similarly, Gökçen, Furnham, Mavroveli, and Petrides (2014) found that adults in Hong Kong differed from those in the UK in terms of trait emotional intelligence (i.e. a stable combination of 'self-perceptions of one's emotional abilities,' p. 30). Specifically, British participants tended to score higher on emotionality, sociability and well-being. The study did not use probability samples however, so generalizations are limited. Mesquita (2001) reported to have found cultural differences in emotional responses themselves, but they were based on self-reports. Markus and Kitayama (1991) also speculate that the experience of emotion is culturally determined, at least in part, but their claims are more inferential than empirical and more social psychological than biological. Thus, we can conclude that while there are culturally linked aspects of emotion, there is little evidence to suggest that emotions or the motivational systems connected to them vary cross-culturally.

Addressing this gap prompts us to attempt to empirically assess whether MAM is indeed universal. If it is, more or less, we would see a similar pattern of scores across the samples from both countries. Given the fundamental nature of the human nervous system, the Asian DSA and ASA scores are likely to follow the same direction as those in the American samples, but the extent to which they do is yet unknown. Therefore, the first research question is formulated.

RQ1: To what extent are the ASA and the DSA similar across the Asian and the American samples?

MAM and personality factors

This investigation of ASA and DSA in a different cultural context also enables examining their associations with established measures of theoretically related facets of human personality. Previous research has found that the variation in the reactivity of the motivational systems is significantly related to many aspects of human personality – such as sensation-seeking, risk-taking and behavioral inhibition propensities (Lang, 2006; Lang et al., 2007; Lang et al., 2005). Conceptualized as a function of an overactive appetitive motivational system and weakly active aversive motivational system, sensation-seeking is 'a trait defined by the seeking of varied, novel, complex, and intense sensations and experiences, and the willingness to take physical, social, legal, and financial risks for the sake of such experience' (Zuckerman, 1994, p. 27). Indeed, sensation-seeking was found to be significantly associated with exploratory tendencies toward novel situations, approach toward intense novel stimuli, sociability, dominance, impulsivity, sexual and consumatory behaviors, substance-use, criminal behavior, social violations, risk-taking behaviors (Horvath & Zuckerman, 1993; Nower, Derevensky, & Gupta, 2004; Steinberg et al., 2008; Zuckerman, 1994, 1996; Zuckerman & Kuhlman, 2000). As one might expect, ASA scores are positively correlated with sensation-seeking, while DSA scores are negatively correlated (Lang et al., 2005).

As with emotional responding, arguments have been made for both the universality of personality and its influences, and for culturally based differences. For example, McCrae & Costa (1997, 1999) say that the core dimensions of personality are ubiquitous, and the five-factor model (FFM) that they developed applies to any population. Their early work validated the FFM across cultural contexts and supported the universality thesis (e.g. Yang, McCrae & Costa, 1998), but subsequent research has revealed significant variance in the emphasis of the dimensions among different populations (McCrae et al., 2010). Along the same lines, Matsumoto, Hwang, and Yamada (2012) found that personality mediated cultural differences in the interpretation of facial affect. Similarly, Markus and Kitayama (1991) link personality attributes to emotional control and expression. These studies suggest that it would be worthwhile to examine the relationship between certain personality attributes and characteristics of appetitive and defensive motivational systems.

By definition, the defensive system is a protective mechanism averse to taking risks but favorable toward inhibiting behaviors elicited by intensely negative, potential threatening environmental stimuli. Therefore, as expected, the DSA has been found to be positively correlated with key personality traits such as risk-aversion and behavioral inhibition propensities (Lang et al., 2005; Lang et al., 2007). Indexing cognitive decision-making and the

probability of making more or less risky choices, the General Risk Aversion Scale (GRAS; Mandrik & Bao, 2005) is an established measure of risk-aversive tendencies. The activation of the inhibition system was initially assessed through a self-reported questionnaire called the Behavior Inhibition System scale (BIS; Carver & White, 1994).

In line with the predicted positive relationships between ASA and sensation-seeking, the ASA assessed in the Asian sample is also predicted to correlate positively with sensation-seeking. Moreover, in line with the theoretical background and the findings in American context, the DSA assessed in the Asian sample is predicted to correlate negatively with sensation-seeking as well as positively with GRAS and BIS. The following hypotheses are expected to hold up:

H1: ASA will be positively related to SS.

H2a: DSA will be negatively related to SS.

H2b: DSA will be positively related to GRAS and BIS.

MAM and media use

Researchers have explored the role of media in satisfying human needs (Katz et al., 1974). Strong support has been found that psychological factors trigger distinct patterns of media use (Bryant & Zillmann, 1984). Consistent with the U&G theory, predictions can be made about the media genres and programming people are interested in consuming according to their appeal through motivationally based attributes. Thus, based on their individual-level variation in the underlying motivational activation, it is expected that people with higher ASA are more likely to approach novel, interesting, or arousing phenomena, including media fare. On the other hand, the patterns of media use and preferences of people with higher DSA will reflect more aversive responses. That is, those with greater DSA will be more likely to avoid potentially threatening situations or stimuli, as well as media.

Individuals with a higher ASA have a higher threshold of excitatory potential. Therefore, they are capable of tolerating higher levels of tension and arousal that often come with certain types of media experiences (e.g. horror films or violent computer games), and may seek out this kind of media fare. These inclinations are driven by what is essentially a dispositional attribute or trait. In a related manner, mood-management theory (Zillmann, 1988, 2000) states that when individuals are in excitation-seeking moods highly arousing entertainment media are typically their preferred choices (Zillmann, 2000; Zillmann & Bryant, 1985). Looking to produce more excitement, the individuals higher on ASA are more likely to consume the highly arousing, novel, or interesting media fare than those lower on ASA.

In contrast, individuals higher on DSA have a more sensitive defense system with a lower threshold of activation. This means that they are capable of reaching high levels of activation very quickly. By reaching the threshold levels so rapidly, highly negative and arousing stimuli subsequently lead to uncomfortably high levels of negative emotion in individuals with a higher DSA. They thus tend to stay away from media fare that is likely to overexcite or distress them. Therefore, people with higher DSA will likely seek to manage their emotional states and their excitatory homeostasis by avoiding

highly arousing and negative stimuli (Zillmann, 1988, 2000). Moreover, as these individuals are easily overstimulated and disturbed to uncomfortable levels, they prefer media that is more positive or more calm. Their interests go toward consuming less suspenseful, less arousing, negative messages, and more predictable and non-exciting entertainment.

In line with the sensation-seeking literature (Bryant & Zillmann, 1984; Dollinger, 1993; Krcmar & Greene, 1999; Perse, 1996; Potts, Dedmon, & Halford, 1996; Schierman & Rowland, 1985; Slater, 2003; Weisskirch & Murphy, 2004), Potter et al. (2011) hypothesized that individuals with greater ASA prefer competitive or violent games, highly arousing, more 'rebellious' and unpredictable programming but are less interested in consuming mundane and predictable media. On the other hand, individuals with greater DSA were hypothesized to prefer more tame, calm and less arousing media. The results of the study supported predictions that ASA correlated significantly with sports, adults-only programming, soap-operas, war-games, sports games, fighting games, squadron games, role-playing games as well as rap and rock music. The study also found significant positive correlations with animal shows, talk-shows, documentaries and information-shows. Analyzing the reported results, the overall pattern seems to be that ASA correlates positively with media use in general. That is, people higher in ASA use media more than those lower on that propensity. DSA was found to have a significant, positive correlation with news, talk-shows, weather programming, situation comedies, soap-operas, some game shows, puzzles or classical games, repetitive and familiar music such as Top 40, soft rock or country. Research also found DSA to be negatively correlated with adults-only programming and with most violent and competitive computer games. These patterns of relationships are logical, yet no studies have looked at these associations in a non-American context.

Singapore was chosen as an appropriate non-American context for the comparison of MAM predicting media preference because Singaporeans have a regular diet of Western (American) as well as Asian media (Banerjee, 2002; MDA, 2011). They are also frequent game players of the popular Western games. Their music/radio listening is fairly limited to pop music though, which might pose limitations to the present investigation in this category. In line with findings of Potter et al. (2011) and consistent with MAM development (Lang et al., 2005; Lang et al., 2007), the present study posits that ASA will correlate negatively with soap-operas and positively with self-reported interest in more arousing, unpredictable, competitive, or violent content such as action, drama, true crime, thrillers, horror movies, sporting, adults-only programming, violent/competitive games, as well as rap, rock music, documentaries, animal shows and various TV shows. DSA is predicted to correlate negatively with highly arousing programming genres such as adults-only programming, true crime, action programming, crime dramas as well as violent, competitive computer games. It is also predicted that DSA will correlate positively with tame and predictable media content such as situation comedies, soap-operas, game shows, news, talk-shows, puzzles or classical games, repetitive and familiar music. The following hypotheses are formulated:

H3a: ASA will correlate negatively with mundane, predictable media.

H3b: ASA will correlate positively with highly arousing, unpredictable, competitive, violent, or rebellious content.

H4a: DSA will correlate negatively with highly arousing programming genres.

H4b: DSA will correlate positively with tame and predictable media content.

Method

An online survey was designed to address the formulated hypotheses. It included a version of MAM (Lang et al., 2009), and measures of key factors of human personality: the BIS (Carver & White, 1994), GRAS (Mandrik & Bao, 2005), two short measures of sensation-seeking tendencies called the SS2 and BSSS-4 (Slater, 2003; Stephenson, Hoyle, Palmgreen, & Slater, 2003), as well as a battery of questions assessing respondent interest in different media programs and genres. Duration of questionnaire completion averaged 20 to 30 minutes and it was finalized in one sitting.

Participants and procedure

The online questionnaire was conducted among 865 volunteers of young adulthood age, the current sample being similar to those used in previous studies conducted in the United States of America. Because conceptual generalizability and theoretical exploration are the primary goals of this study, random sampling is not required (Shapiro, 2002). Data were collected using SurveyMonkey. It is a low cost, and privacy protective method that can yield good response rates (Tourangeau, 2004). Particularly important for this study, it lowers social desirability responses (Tourangeau, 2004; Tourangeau, Rips, & Rasinski, 2000) likely to surface in such investigations.

The respondents were enrolled at a large Singaporean university and recruited from introductory-level classes by offering extra credit or other incentives for participation. Volunteers received an email with a link to an initial page containing the informed consent form, which was read and signed, and which then allowed them to enter the online questionnaire. The link to the online questionnaire was available for two months (October–November 2014), and most respondents completed their answers immediately upon receiving the email.

Measures

MAM and other personality measures

The activations of the motivational systems were measured through MAM – an instrument developed, validated and established by Lang et al. (2007, 2009, 2011). MAM is a relatively new indirect measure indexing biological level appetitive (ASA) and defensive motivation system activation (DSA). The measure is well grounded in theoretical work on the activation of the approach and aversive motivational systems (Cacioppo & Gardner, 1999; Ito et al., 1998; Lang et al., 1990). It is not based on self-reported preferences or behaviors; instead, it involves picture viewing and rating of emotional responses to selected standardized IAPS (Lang et al., 1999) images, varying across emotional space. DSA is calculated through participants' ratings on how negative they felt during viewing the IAPS images selected for miniMAM (a short validated version of MAM; Lang et al., 2011). ASA is calculated through participants' ratings on how positive they felt during

viewing the IAPS images selected for youth-oriented MAM (Yo-MAM) – this decision was made because many of our participants were under the legal age of 21 and Singapore law restricts the mediated presentations of nudity to minors. Each image was shown on an individual page in random order.

Participants viewed all IAPS pictures and rated how aroused, how positive and how negative they felt using nine-point semantic differential scales, with options ranging from 1 (not at all) to 9 (extremely). Each participant provided estimations of arousal first, followed by the appraisals of positivity and negativity feelings – which were presented in random order across trials.

Following the MAM technical manual specifications (Lang et al., 2009), DSA scores were computed by subtracting average negativity ratings of IAPS images at arousal level 1 from the average negativity ratings of negative IAPS images at arousal levels 3 and 4; ASA scores were computed by subtracting average positivity ratings of IAPS images at arousal level 1 from the average positivity ratings of positive IAPS images at arousal level 6.

Participants also completed the SS2 and the BSSS-4 indexing sensation-seeking tendencies (Slater, 2003; Stephenson et al., 2003). Additionally, the questionnaire recorded responses on the BIS (Carver & White, 1994), a measure conceptualized to index the negative affect related to behavioral inhibition (seven items such as 'I worry about making mistakes'). It also recorded responses on the GRAS (Mandrik & Bao, 2005), which indexes risk-taking propensities (six items such as 'I do not feel comfortable about taking chances'). Scores were computed and their reliability was validated by conventional standards (Nunnally & Bernstein, 1994). The Cronbach's $\alpha > .7$ for all scales: SS2 = .84, BSSS4 = .79, BIS = .73, GRAS = .74.

Media use

The media use items asked participants to rate their interest across a wide spectrum of media using nine-point semantic differential scales from 1 (not at all interested) to 9 (extremely interested). The questions were worded 'How interested are you in watching/listening to/playing … ' and they focused on three media categories: television, music/radio, and video/computer game genres, respectively. Following the main questions, several categories were listed, along with a number of exemplars. The list of media programs and genres was similar to the one used by Potter et al. (2011). In addition to these, other categories were added, mainly targeting movie genres which are popular in Singapore (see Table 1). Weather was omitted from the media categories because in an equatorial climate there is little variation, weather forecasts are brief and unremarkable, and there is no local version of The Weather Channel. Kids programming was also removed with the reasoning that none of the young college-going adults watch *Dora the explorer* or other programs targeting 2–5 age groups. Other categories were deleted because they were not relevant to the context of Singapore media, such as: NPR, National news, Movies on premium cable, Movies on basic cable, etc. The list of the specific media genres and exemplars provided for them, added to those used by Potter et al. (2011), are available in Table 1. Efforts were made to find the most appropriate current exemplars for both Asian and American programming, likely to be part of the media diet of Singaporean young adults through pretesting.

Table 1. Media genres and exemplars added to those from American media used by Potter et al. (2011).

Media genres	Exemplars[a]
Television genre	
Action	Hawaii Five0[a], City Hunter[a]
Cable news nets	Channel News Asia[a]
Crime dramas	Breaking Bad[b], Criminal Minds[b]
Daytime talk-shows	Ellen DeGeneres Show[b], Dr. Oz Show[b], Waratte Iitomo[a]
Game shows	Wipeout, Ninja Warrior, Sasuke Singapore, Kaun Banega Crorepati[a]
Live sitcoms	Big Bang Theory[b], Two and a half Men[b], Phua Chu Kang[a], Police and Thief[a], Sarabhai Vs Sarabhai[a]
Night time talk-shows	Jimmy Kimmel Live[b], The Tonight Show starring Jimmy Fallon[b], Comedy Nights with Kapil[a], Koffee with Karan[a], Strong Heart[a], Happy Together[a]
Prime-time drama	The Vampire Diaries[b], Game of Thrones[b], The Heirs[a]
Reality competition	Bigg Boss, MTV Roadies, Masterchef, MTV Splitsvilla[a]
Reality performance	Indian Idol, Comedy Circus, The X Factor, The Voice, Immortal Song[a]
Soap-operas	Night Market Life, Kyunki Saas Bhi Kabhi Bahu Thi[a]
Sports programing	athletic games, football, basketball, tennis, cricket, etc.
True crime	Crime Watch[a]
Variety shows	Running Man, 1 Night 2 Days[a]
Audio genre	
Classic rock	Wu Bai & China Blue[a]
CPop/Mandpop	Jay Chou, S.H.E., Stefanie Sun[a]
DJs	Calvin Harris, Tiesto, Hardwell, Kaskade[a]
Jpop	Arashi, AKB48, SMAP[a]
Kpop	Girls' Generation, Super Junior, EXO, BIGBANG[a]
Rap	JayZ[b], Machi[a], Tiger JK[a]
Rhythmic/urban	Shota Shimizu[a]
Soft rock	Mayday, Nell, Flumpool[a]

Note: [a]Exemplars from Asian media were added to those from American media used by Potter et al. (2011).
[b]Several American programs currently popular in Singapore were also added.

Preselection study for media use exemplars

Exemplars were identified for all media categories under investigation. To this end, a list with more than 100 programs, shows, artists, channels, etc. was generated based on publicity materials (e.g. advertisements, program schedule summaries, etc.), discussions with Singaporean colleagues and content analyses that identified specific media fare as representative of a genre or program. Efforts were made to offer options from a wide range of Asian media (including Chinese, Indian, Malay, Korean, Japanese, Taiwanese, etc. along with local Singaporean content) so that the multi-ethnic population would be able to find their favorite programs. The next step involved ratings ($n = 47$) of all media fare through online survey procedures. Participants were demographically similar to the main study's sample and were specifically asked to only rate the shows they are familiar with. Questions were worded: 'How representative are the following shows/music artists for each media category listed?' Participants used 6-point Likert scales ranging from 1 (the least representative) to 6 (the most representative) available as change options from the default 'Don't know.' Based on these ratings, the most representative programs, shows, artists, channels, etc. were selected as exemplars for inclusion in the media use questionnaire.

Data cleaning and analysis

Questionnaire completion reached over 95%. Missing values were estimated using maximum likelihood models, consistent with methodological recommendations and

previous research (Collins, Schafer, & Kam, 2001; Graham, Hofer, & MacKinnon, 1996). The cleaned data were submitted to bivariate correlation analyses. Pearson's r statistics are reported and $p < .05$ was used as a level of statistical significance.

Results

The mean age of the respondents was 21.4 ($SD = 1.8$), ranging from 18 (3%) to 31 (.1%). The majority of participants reported middle household income levels. There were 426 (50.1%) self-identified male and 424 (49.9%) self-identified female respondents. Their ethnic backgrounds were diverse, consistent with the multi-ethnic Singaporean population: most of them (85.4%) were of Chinese ethnicity, some were of Malay (3.1%) or Indian (3.7%) descent.

The MAM

Research Question 1 addressed the scores of the ASA and the DSA measures recorded in the two cultures. The descriptive statistics for these measures are provided in Table 2. As evidenced, the ASA and the DSA scores recorded similar levels to those found in previous studies (Lang et al., 2009; Lang et al., 2011; Potter et al., 2011).

MAM and personality factors

Hypotheses 1 and 2 examined the associations of the ASA and the DSA with theoretically related measures of key factors of human personality such as sensation-seeking, risk-aversive and behavioral inhibition propensities. In line with the prediction between ASA and sensation-seeking, ASA assessed in an Asian sample correlated positively with sensation-seeking – as measured through the short SS2, $r = .128$, $p < .0001$ and as measured through the short BSSS-4, $r = .222$, $p < .0001$. In line with the prediction between DSA and sensation-seeking, DSA assessed in an Asian sample correlated negatively with sensation-seeking – as measured through the short SS2, $r = -.115$, $p < .0001$ and as measured through the short BSSS-4, $r = -.067$, $p = .05$. DSA correlated positively with risk-aversive tendencies (GRAS), $r = .079$, $p = .02$, and behavioral inhibition propensities (BIS), $r = .199$, $p < .0001$. Hypotheses 1 and 2 were supported.

Table 2. ASA and DSA descriptive statistics for the current study compared to previous studies.

	Current study		Initial MAM		miniMAM experiment 1		miniMAM experiment 2		miniMAM (Potter et al., 2011)	
	ASA	DSA	ASA	DSA	ASA	DSA	ASA	DSA	ASA	DSA
Mean	2.45	3.39	2.29	3.78	2.38	4.08	2.52	4.11	2.24	4.01
Standard deviation	1.65	1.49	1.76	1.26	1.42	1.23	1.41	1.17	1.39	1.35
Minimum	−3.60	−1.21	−1.95	.08	−1.71	.29	−1.43	.71	−2.00	−4.43
Maximum	6.71	6.86	6.36	6.85	7.00	7.21	6.50	7.00	6.00	6.71
N	865		427		585		277		206	

Note: MAM descriptive data provided by Lang and colleagues (2009, 2011) and Potter et al. (2011).

ASA and media use

Consistent with the U&G theory and with the mood-management theory, predictions were made about the media genres and programming people would be interested in consuming according to their appeal through motivationally based attributes. Based on their individual-level variation in the underlying motivational activation, it was expected that individuals with greater ASA would prefer more arousing, unpredictable, competitive, violent, or rebellious content. At the same time, they would report less interest in consuming more mundane and predictable media.

Indeed, results revealed significant positive correlations between ASA and action movies and TV shows, dramas, true crime shows, sports, adults-only programming, violent and competitive games (see Table 3). Along similar lines, this study also found significant positive correlations with all the unpredictable and competitive TV shows we inquired about: game shows, variety shows, reality competition and reality performance shows. ASA also correlated positively with the suspenseful, arousing and unpredictable thrillers and horror movies. Similar to results reported by Potter et al. (2011), interest in animal shows as well as information-shows correlated positively with ASA. Also similar to the study by Potter et al. the only significant negative correlation of ASA was with the more mundane and predictable soap-operas. Other significant positive correlations were found with sitcoms and romantic comedies. In terms of music, ASA correlated positively with country, soft rock, top 40, DJ-music and negatively with adult alternative and Christian contemporary music. Hypotheses 3a and 3b were supported for the predictions about TV genres and programming and the computer/video games, but not about the audio genres.

Table 3. Correlation between ASA and media use interest by medium genre/programing type.

Television Genre	Pearson's r	Audio Genre	Pearson's r	Videogame type	Pearson's r
Action-adventure	.152**	Adult alternative	−.106**	Casual/Puzzle games	.051
Action TV	.138**	Alternative rock	.003	Classic games	.040
Adults-only programing	.111**	Christian contemporary	−.077*	Fight games	.068*
Animal shows	.074*	Classic rock	.005	MMOGs	−.046
Cable news	−.008	Classical music	−.019	Race games	.149**
Crime drama	.175**	Country music	.129**	Role-playing games	.012
Daytime talk-shows	.057	C-pop	.039	Simulation games	.040
Documentaries	.012	DJs	.114**	Sport games	.019
Dramas	.099**	Electro Dance	.016	Squadron games	.099**
Game shows	.088**	Jazz	−.039	Strategy games	.010
Home-shopping	.005	J-pop	−.060	War-games	.027
Horror movies	.132**	K-pop	.046		
Information-shows	.082*	Rap	.008		
Live sitcoms	.101**	Rhythm/Urban	.030		
Local news	.063	Soft rock	.083*		
Music videos	.043	Top 40	.183**		
Nighttime talk-shows	.056				
Popular dramas	.140**				
Reality competition	.095**				
Reality performance	.084*				
Romantic comedies	.105**				
Soap-operas	−.081*				
Sports programming	.090**				
Thrillers	.166**				
True crime	.112**				
Variety shows	.095**				

*p < .05, **p < .01.

DSA and media use

Patterns of media interest and use by people with more sensitive defense system activation were hypothesized to go toward consuming less suspenseful but more predictable and non-exciting entertainment messages. Indeed, results (see Table 4) show that individuals high on DSA preferred more tame and predictable media such as talk-shows and romantic comedies. They were also found to prefer dramas or action-adventure programs and to be more interested in repetitive and familiar music such as Top 40, soft rock, country music than the less cadenced rock, adult alternative and electro music. Their computer/video games preferences also supported the predictions made. Individuals greater on DSA were more interested in playing traditional puzzles games. They were less interested in playing competitive and violent games such as MMOGs, sports, squadron, war or fight games as they were more likely to avoid potentially threatening stimuli. As predicted, individuals high on DSA also avoided highly arousing programming genres such as adults-only programming. In terms of visual media (TV), they also avoided sport programming and horror movies. Hypotheses 4a and 4b were supported.

Discussion

The main goal of this study was to explore how the MAM applies in a non-American context. The results support the notion that MAM is a universal measure of motivational systems activation, capable of identifying biological-level differences in the ASA and DSA across cultures. The first research question investigated the variation in the ASA and the DSA measures between the two cultures. A similar pattern of scores across the samples

Table 4. Correlation between DSA and media use interest by medium genre/programing type.

Television genre	Pearson's r	Audio Genre	Pearson's r	Videogame type	Pearson's r
Action-adventure	.102**	Adult alternative	−.142**	Casual/puzzle games	.131**
Action TV	.042	Alternative rock	−.045	Classic games	.033
Adults-only programming	−.123**	Christian contemporary	−.069*	Fight games	−.109**
Animal shows	.037	Classic rock	−.077*	MMOGs	−.096**
Cable news	−.028	Classical music	.037	Race games	.054
Crime drama	.059	Country music	.165**	Role-playing games	.037
Daytime talk-shows	.070*	C-pop	.106**	Simulation games	−.062
Documentaries	.014	DJs	−.064	Sport games	−.116**
Dramas	.128**	Electro dance	−.078*	Squadron games	−.081*
Game shows	−.030	Jazz	−.026	Strategy games	.008
Home-shopping	−.004	J-pop	−.012	War-games	−.103**
Horror movies	−.074*	K-pop	.045		
Information-shows	−.027	Rap	−.054		
Live sitcoms	.039	Rhythm/urban	−.009		
Local news	.010	Soft rock	.079*		
Music videos	.062	Top 40	.124**		
Nighttime talk-shows	−.008				
Popular dramas	.068*				
Reality competition	.014				
Reality performance	.056				
Romantic comedies	.127**				
Soap-operas	−.022				
Sports programing	−.105**				
Thrillers	−.001				
True crime	.019				
Variety shows	.010				

*p < .05, **p < .01.

from both countries was found. Nevertheless, MAM appears to index variation in the DSA that is certainly influenced by biology and perhaps also culture. The recorded DSA scores are slightly lower in the Singaporean sample. This could be due to the slightly different set of stimulus images presented to the two populations. However, the main difference was that no images of nudity were shown to the Singaporean participants, and those images are generally associated with ASA, not DSA. Thus, the lower aversive/DSA is likely not due to the stimuli, but some exogenous factors that are environmental, and possibly culturally influenced. Singapore is well known as a place where safety and security are both highly regarded and enacted. In fact, the contrast with Western societies is often highlighted (Acharya, 2001), and heightened security is occasionally used to justify curbs on personal freedoms. So we may conjecture that Singaporeans might manifest lower activation in DSA since they are living in a very safe environment, with abundant rules and regulations to protect them, and few daily threats. The fact that Singapore has been and continues to be one of the safest countries in the world (Lee, 2016) is a point of pride for both the government and its citizens. It is plausible that such an environment influences individuals' responses to negative stimuli by making them seem less threatening. Supporting this conjecture, Hofstede (1983) found that Singaporeans tend to score low on the uncertainty avoidance scale, which can reflect aversive responses to potential threats.

Not only did the ASA and the DSA scores record similar levels to those found in American samples, but they significantly correlated with established measures of theoretically related facets of human personality, in support of the first two hypotheses. Activation in the appetitive motivational system significantly associated with sensation-seeking as predicted: individuals higher in ASA were more likely to seek varied, novel, complex, and intense sensations and experiences, and they are more likely to take physical, social, legal and financial risks for the sake of such experiences, tendencies which are known as sensation-seeking (Zuckerman, 1994). At the same time, sensation-seeking tendencies inversely related to the activation of DSA. The defensive motivational system activates protective mechanisms reluctant to taking risks but favorable toward inhibition behaviors elicited by negative, potentially threatening stimuli. As predicted, DSA was found to be significantly correlated with risk-aversive and behavioral inhibition propensities.

A number of studies have documented MAM to be a valid and reliable indicator of individual trait-level variation in the reactivity of the ASA and the DSA in the United States of America (Lang et al., 2005; Lang et al., 2007; Lang et al., 2011; Potter et al., 2011). This research has provided empirical evidence that MAM is capable of recording differences in the activation of the appetitive and defensive motivational systems in a different cultural context. Furthermore, this study examined how the individual differences in motivational systems responsiveness correlate with media use in an Asian context. The third hypotheses predicted that ASA would correlate negatively with mundane, predictable media and positively with highly arousing, unpredictable, competitive, violent, or rebellious content. Hypothesis 3 received partial support. Trait-level activation in the appetitive motivational system had significant negative correlation with the mundane and predictable soap-operas. It also predicted audience interest in highly arousing, unpredictable and competitive media. Similar patterns emerged for video/computer games, where those high in ASA preferred violent and competitive games. These findings are consistent with those reported

by Potter et al. (2011). ASA was also positively correlated with the suspenseful, arousing and unpredictable thrillers and horror movies, which elicit negative emotional reactions from viewers by affecting their primal fears and anxieties. This study also found that ASA related positively with audience interest in watching sitcoms and romantic comedies, which was not hypothesized, but possibly relates to a preference for pleasurably entertaining genres in individuals with a high propensity for the activation of ASA. In effect, results reported in this study, together with those by Potter et al. (2011), seem to support the idea that ASA correlates positively with media use in general. Given its widespread appeal, and high levels of use across the developed world, mediated content in general can be regarded as being both stimulating and entertaining.

In contrast to the television genres and computer/video game types, where ASA results followed predicted patterns, interest in music genres in Asia did not associate with the activation in the appetitive motivational system as predicted. The results show positive correlations between ASA and country, soft rock, top 40, which are not quite among the unpredictable, rebellious content expected to lure individuals with a high-approach system activation. However, such descriptions might fit the DJ-music which also correlated positively with ASA. The soft adult alternative as well as the Christian contemporary music, which correlated negatively with ASA, arguably fit the mundane, predictable, less arousing and less rebellious genres which drive away the audience members with a high-approach system activation. The ASA media use hypotheses (3a and 3b) were supported for the predictions about TV programming and the computer/video games, but not about the audio genres. This might be due to an Asian-specific music diet which is largely limited to pop (Music of Singapore, 2010), bringing some limitations to the investigation in this particular category.

With respect to our last pair of hypotheses, sensitivity in the defense system activation was expected to relate negatively with highly arousing programming genres. In contrast, the same sensitivity in DSA was predicted to relate positively with tame, familiar and predictable media content. As expected, the more tame and predictable television genres such as talk-shows and romantic comedies, as well as the more repetitive and familiar music such as Top 40, soft rock and country music related positively with DSA. In terms of computer/video games, the more traditional and tame puzzles games – where the objective is to compete with oneself in a less arousing context – attracted those with a higher aversive/DSA. In other words, this kind of media fare might be seen as an unthreatening means of being engaged in an activity without the worry of something unexpected or upsetting happening.

DSA also related positively with dramas and action-adventure programming – this might be explained through the insight of media gratification (Oliver, 1993). Oliver explains the paradox of enjoying negative emotional stimuli through meta-emotions, positing that the viewers may enjoy negative content not necessarily because the specific media succeeds in evoking positive affect but, rather, because the experiences of distress and sadness themselves might be ultimately perceived as gratifying. In contrast, highly arousing TV genres such as adults-only programming, sports and horror movies, the more competitive and violent games, the less cadenced rock, adult alternative and electro music – all correlated negatively with DSA, in support of our last hypotheses. Motivational systems indeed influence the choices audiences make when it comes to media content and mediated activities.

As with all research, the study had some limitations. First of all, we should acknowledge the potential drawback of the sample of participants, namely university students. The issue of using undergraduates for social research has been debated; however, the current sample was consistent with previous studies and allowed for the most propitious comparisons. Future research could explore more diverse populations. Second, the use of Yo-MAM – because of the underage respondents and because Singapore law restricts the mediated presentations of nudity to minors – should also be mentioned as a potential limitation. Although the results have a similar pattern of scores and associations for ASA, a comparison with scores obtained on the full miniMAM should be part of further investigations. Future studies could include a wider and older age range of participants, and could also use all the MAM images.

While acknowledging these shortcomings, we believe that the findings of the present study contribute to understanding how the MAM applies in a non-American context. This study actually represents the first examination of MAM's universality asserted through its theoretical underpinnings as an indicator of biologically based appetitive and aversive motivation systems. The combination of the findings reported here provides strong support that MAM manages to index variation in the trait-level activation of the appetitive and defensive motivational systems across cultures. Moreover, this study suggests that MAM is also capable of predicting media use and interests. The research reveals that the deeply ingrained motivational substrates underlying human needs have been successfully identified through MAM and are effective predictors of patterns in media use. It thus points to the potency of bio-psychological perspectives to U&G theory, in response to a long-standing call from media scholars to better explain media use motivations (McLeod & Becker, 1981). This new approach allows researchers to tackle the bio-psychological underpinnings of human needs leading to differential patterns of media use. We believe our study adds to the literature by showing that MAM manages to indexes enduring dispositional traits in motivation systems activation as well as to predict media use and preferences.

Disclosure statement

No potential conflict of interest was reported by the authors.

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