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MOOD, MEDIA EXPERIENCES AND ADVERTISING

Fred Bronner
Stephan van Velthoven

Abstract

Studying moods and the effects that a mood has is an important topic in research into advertising. But nearly all data on mood effects are gathered in a forced exposure and lab context. In a real-life study we relate in this contribution mood to moments of media consumption. So we analyze at the level of a specific media consumption moment. Concluded is that there is a relation between mood and media experience and via this route with advertising effectiveness. And that this relationship differs for print and broadcast media. The mood of a consumer confronted with advertising is an important factor influencing the effectiveness of this advertising upon this consumer. Implications of our findings for the commercial media and advertising world are sketched.

1 Introduction: mood and advertising

Moods are capable of influencing affective, cognitive and behavioral responses to a wide array of objects, persons and events (Luomala & Laaksonen, 2000). Different definitions of mood have appeared in journal articles and books. These vary from simple definitions such as ‘moods are barometers of ego’ (Jacobsen, 1957) to complex ones like ‘moods are complex affective states without a specific target, that are pervasive in their effect. In other words, moods are both states and responses to previous experiences that affect future behavior and experiences’ (Gnoth et al., 1999). Luomala and Laaksonen (2000, p.197-201) present a review of mood definitions. And they conclude that the first salient feature of the mood definitions is their heterogeneity. But all authors discern some common elements: (1) moods are omnipresent, (2) they can be seen as feeling states that are subjectively perceived by individuals, (3) mood states are transient and fleeting and easily influenced by little things. Moods have a lower level of intensity in comparison with emotions. Emotions, by contrast, are usually more intense, attention-getting, and tied to a specifiable behavior (Clark & Isen, 1982), (4) mood is influenced by different factors (Silberer & Jaekel, 1996), (5) mood is
defined most often as a unidimensional, bipolar phenomenon that ranges from positive to negative.

Moods are also capable of influencing consumer behavior in many contexts, e.g. advertising and brand selection (Gardner, 1985; Batra & Stayman, 1990; Martin, 2003). The relationship between mood and advertising is studied in the literature from two perspectives. In the first perspective, mood is considered as an antecedent state because a mood can be present before the consumer is exposed to the ad (Burke & Edell, 1989). Research is focused on the influence of a mood state on advertising noting and processing. The second perspective focuses on the relationship the other way around: mood states can be influenced by marketing tactics. Advertising can serve as a mood enhancer (Chang, 2006) and may well do more than provide product information. In this paper, mood is considered as an antecedent state (the first perspective).

2 Mood and advertising: research designs

Studying moods and the effects that a mood has is an important topic in research into advertising. But nearly all data on mood effects are gathered in a forced exposure and lab context. In laboratory studies, participant mood manipulation takes place, for example, by means of a clip used to induce a negative or positive mood (Puccinelli, 2006). For example, a negative mood being induced by a film depicting illness/death, a positive mood by a comedy featuring Bill Cosby or Mr. Bean. Many of the findings based on laboratory studies require replication under more realistic condition. Shapiro, MacInnis and Whan Park (2002) conclude after carrying out such a study: ‘……similar to most controlled experiments on mood, our study is limited by the use of a forced exposure context, student subjects, and a lab context. Assessing the generalizability of our findings to more naturalistic contexts is likely a research priority’ (p.24). Mood manipulation in such a context may also affect other psychological variables that have the ability to affect decision-making effort and thus generate confounding effects (Hill & Ward, 1989). Hill and Ward (1989, p.101) conclude at the end of their paper about this problem: ‘like researchers, managers need to consider carefully whether ‘mood’ manipulations influence more than mood.’ Furthermore samples in a lab context consist in many cases of undergraduate students whose reactions to the experiment might not generalize to other groups of consumers. So we can conclude we need more real life studies about the relation mood-advertising.
At the 5th ICORIA in Bath, Bronner, Bronner & Faasse (2006) presented conclusions about the relationship between mood and advertising exposure based on such real-life data. During a study into the effects of the introduction of a new Sunday edition of a large Dutch newspaper, they had the opportunity to test several hypotheses about the relationship between mood and advertising effectiveness. In a real life study it was possible to show that people in a better mood see more advertising, people are in a better mood on Sunday, which can explain the high Sunday advertising reach scores as compared with the benchmarks. The relationship between mood and advertising noting remains significant in analyses in which as control variables other possible explanatory factors such as size of the issue or available reading time were used (Bronner, Bronner & Faasse, 2007). So these data confirm the hypothesis that mood is the main explaining factor for higher advertising noting in the Sunday issue. This study had the advantage of realistic conditions, but has the limitation that the relationship between mood and advertising was measured on a newspaper issue-basis (issue-specific). The Sunday mood was measured for a specific Sunday and related to the advertising exposure in a particular Sunday newspaper. But as we said at the beginning of this paragraph, moods are typically transient and fleeting. Morris (1989) believes that the mildest moods can last a couple of hours, but certainly no longer than a day, however. So, assuming that Morris is right, this implies that a further improvement in measuring the relationship between mood and advertising is to go one step further – from measurement on an issue-specific basis towards measurement at the moment of media consumption. In this study mood is related to moments of media consumption. So, in comparison with the ‘classical’ laboratory studies concerning the relationship between mood and advertising we are making two improvements: (1) we collect real life data (2) we analyze at the level of a specific medium consumption moment. The combination of these two realistic elements increases the chance that conclusions can be drawn which can help marketing people in developing new marketing tactics.

In scheme 1 the different possible methods to study the relation between mood and advertising are sketched and the approach followed in this paper is encircled.
3 Research questions

In this study, we are able to relate mood state to the experience of a well-defined specific media consumption moment such as yesterday’s watching of TV program x. In the Dutch Media Experience Monitor (Bronner & Neijens, 2006, see also for media experiences Malthouse et al., 2003), a battery of 30 experience items divided over 8 dimensions is used. The items are selected on the basis of extensive pre-research and multivariate analyses. Data are available for two measurements with an interval of seven years. Differences between the factor solutions of both measurements were minimal. For each selected moment, the respondents have to indicate the applicability of these items.

To relate mood and experience, we have the required number of observations for four media types: TV, newspapers, magazines and free local papers. So we can make a distinction in the analyses between print and broadcast media. In the study, one mood question is available with three answer categories (‘everything went wrong/normal/everything went super’). So we can relate these mood results to the 8 experience dimensions of 4 media (8 x 4 = 32 relations). Given this data-set, we can formulate our two central research questions:

RQ1: is there a relationship between mood and media experience at specific media consumption moments?
RQ2: does this relationship differ for print and broadcast media?

In RQ1, we study whether the background mood leads to experiencing the media content. And the relevance is that this in turn can affect advertising exposure and processing, because media experience is related to advertising experience (Bronner & Neijens, 2006). RQ2 concerns the difference between media. TV offers more freedom to choose programs that are mood-congruent or mood-incongruent. As regards newspapers, in the Netherlands most people have a subscription, so at best you can search for mood-congruent or mood-incongruent elements within a ‘fixed’ medium. Furthermore, print requires more mental effort (Luomala & Laaksonen, 2000), and that may possibly make experience of print consumption moments less dependent upon mood states.

4 Data

The data used are from the Dutch Media Experience Monitor. So it seems appropriate to tell more about this Monitor. The model was developed in 1997/1998 (Bronner, 1999), the study was replicated in 2003/2004 and now (Summer 2007) data for the third wave are collected. So end 2007 comparable data are available to measure trends about media experience during a 10 year period (1997-2007). Moments of media consumption for a broad variety of media are the unit of measurement and the focus of analysis. The crucial point in our approach is that we do not measure attitudes towards media (e.g. ‘the magazine x is ….’) but concentrate upon the experience a media consumer has at a specific media consumption moment, such as yesterday’s reading of a specific newspaper.

*Not:* magazine x is in general entertaining

*But:* I experienced reading magazine x yesterday as entertaining

The core of our measurement model is the battery of 30 experience items, which were selected in 1997 after a literature search by the University of Amsterdam, extensive pre-research and multivariate analysis (Bronner, 1999). We will speak of ‘experience’ because we do not make any assumption with respect to the existence of needs, neither whether these ‘needs’ are motives for choosing. Experience is described as an emotional, intuitive perception that people have while using media (Koppe, 1998). Research has shown that the
way in which people use and experience their media contributes to effects of the advertising in these media (see for example Stewart & Ward, 1994).

Eight experience dimensions could be discerned:

(1) **information**
- offered me something new
- gave me useful information
- gave me credible information
- taught me about what is going on in the world
- enabled me to gain knowledge of the opinions of others
- helped me in forming an opinion

(2) **transformation**
- gave me enjoyment
- made me cheerful
- gave me a pleasant feeling
- gave me a satisfied feeling
- made me forget everything for a moment
- was relaxing
- was suitable for a moment by myself

(3) **emotional touch**
- irritated me
- was rather unclear
- disturbed me
- made me sad

(4) **pastime**
- filled an empty moment
(5) **stimulation**
- excited me
- made me curious
- made me enthusiastic
- fascinated me
- was original and unique

(6) **identification**
- I recognised myself in it
- I felt involved in it
- I empathised with it
- showed me how I could approach problems

(7) **social relationship**
- provided subjects of conversation

(8) **practical use**
- provided me with useful ideas
- motivated me to cut something out/phone/visit a shop

In an eight factor solution all items had a loading above .40 on one of the factors, oblique rotation, all factors had eigenvalues larger than 1.00. Differences between the factor solutions of 1997/1998 and 2003/2004 were minimal. These 30 items were used to measure media experience.

Veldkamp and TNS NIPO carried out the project. In both measurements (1997/98 and 2003/04) a representative sample 13+ of about 1000 respondents was interviewed. The media surveyed were: television, magazines, newspapers, radio, mail and non-mail, free local papers, cinema and internet. For data-collection CASI (Computer Assisted Self Interviewing) was used. CASI is applied in two different ways. In households without a PC an interviewer hands over his/her computer to the respondent, plays a rather passive role, but remains available for instructions and assistance (CASI-IP, Interviewer Present). In PC-owning households the respondent is sent a questionnaire, which s(h)e completes at a self chosen
moment and then returns. All this is done via the Internet or a direct modem connection (CASI-IA, Interviewer Absent). For more details see Bronner, Tchaoussoglou, Ross (2003).

Each respondent was first asked to list which media were consumed recently (yesterday or the day before yesterday). For each medium type the computer selected within the CASI procedure one moment randomly. This measuring procedure has three clear advantages:

1. minimises memory bias
   as the consumption moments are recent, memory distortion is minimal

2. minimises social desirability
   by first listing all the consumption moments within one medium type and then selecting random just one vehicle from that batch, we minimise the risk of respondents giving preference to socially desirable titles or TV programmes or channels

3. minimises order effects
   by arranging the medium types in a random order, we avoid the risk of an ’order bias’.

So if a respondent has seen yesterday four TV-programs a, b, c, d one is randomly chosen, say program b. And about this program b we ask three types of questions:

(a) experience of the viewing of program b with a battery of 30 items divided over eight experience dimensions

(b) a subset of items measuring the general advertising experience within the chosen media consumption moment (in this case viewing program b)

(c) situational characteristics of the moment (e.g. alone/with others, primary/secondary activity, home/elsewhere).

In the 2003/2004 study we collected data about 5000 consumption moments. In the analysis phase we can make (a) comparisons over mediumtypes ( 'are TV consumption moments experienced differently from magazine consumption moments?' ) and (b) within medium types ( 'are TV-crimi's experienced differently from TV-soaps?' ).
In scheme 2 the structure of the questionnaire is outlined.

Did you watch tv yesterday

yes

no

Did you watch tv the day before yesterday

yes

describe all programmes watched

random selection of one programme

measurement of media experience of this moment

advertising seen during this moment

measurement of advertising experience

viewing circumstances and mood

Scheme 2: Structure of the questionnaire

In short we measure the experience scores of recent media consumption moments. These scores can be grouped in various ways or simply added up together. We realise that in the latter case we have a heterogeneous group of media consumption moments, but on the basis of having a randomly selected sample of respondents and a random selection of moments this is a justifiable approach if we want to gather information on how the medium type is experienced as a whole.

The fieldwork was evenly spread over the days in a week because the experience can vary for example between Sunday and weekdays. In order to exclude casual confrontations a threshold of five minutes was set for several medium types.
Significance testing of the relation between mood state and experience of the medium consumption moment is based on ANOVA with post-hoc tests (LSD as well as Bonferroni; results of both tests are presented in the footnotes of table 1-4, see appendix).

5 Results

Looking at the results of the analysis, both Research Questions can be answered in the affirmative. Statistically significant relationships are obtained between mood and media experience (RQ1), and the relationships differ considerably according to media (RQ2). Let’s consider the differences.

Television
When in a positive mood, people get more relaxation out of watching television and experience transformational elements (mood reinforcement). When in a negative mood, they search for informational programs and experience informational elements. Furthermore, there is a relationship with pastime. Individuals in a positive mood use TV more to fill an empty moment (see table 1, Appendix; mood-information $F(2,929)=3.09$, mood-transformation $F(2,929)=2.90$, mood-pastime $F(2,929)=4.05$).

Newspapers
Two of the eight available experience dimensions relate to behavior. And with both factors there is a significant relationship: when people are in a positive mood, the media consumption moment involving newspapers has behavioral effects (behavioral stimulus, readers take actions as a result). In a positive mood, readers have more social interaction concerning articles/advertisements and they absorb more useful ideas and tips, and are more inclined to cut something out or phone or visit a shop after the reading moment (see table 2; mood-social interaction $F(2,672)=2.98$, mood-practical use $F(2,672)=8.68$).

Magazines
Magazines show a mix of the effects observed with TV and newspapers. As with TV, there is a relationship with transformation, and as with newspapers there is a relationship with practical use. A positive mood also generates more identification. Identification is a strong experience factor relating to magazines in all situations but mood generates a kind of fly-
wheel effect concerning this factor (see table 3; mood-transformation F(2,510)=5.39, mood-identification F(2,510)=3.43, mood-practical use F(2,510)=7.10).

Free local papers
As regards free local papers, mood only influences the pastime experience, like TV (see table 4; mood-pastime F(2,436)=5.44).

6 Conclusions

Looking at the results of the analysis, both Research Questions can be answered in the affirmative. Statistically significant relationships are obtained between mood and media experience (RQ1), and the relationships differ considerably according to media (RQ2). More specifically the positive significant relations are represented in scheme 3 (positive mood correlates with high experience scores).

In the rows the experience dimensions where we found a significant relation, so that applies to 5 of the 8 dimensions. And in the columns television and the three print media. So how to read this? The first cell: a positive mood correlates with higher transformation scores assigned by the respondent to the tv program seen. Furthermore one negative correlation was found (negative mood correlates with higher experience scores). In a negative mood people experience more information in tv-programs.

What to conclude? The answer is: (1) there are relations and (2) they differ for print and broadcast. For television we can conclude that there is a kind of search for mood congruence.

People in a better mood search for programs that offer transformation and pick up more transformational elements from the program.

For newspapers a good mood generates behavioral effects: you start talking about articles in the paper, you get new ideas and are taking actions. These findings are in line with a recent Dutch study (Interview/NSS,2007) in which also strong behavioral effects of advertising in print are shown. In this study effects were found upon visiting a shop, buying a product, visiting a website, asking for information and contacting a store or firm.

A better mood seems to generate for magazines a mix of these two effects. And a positive mood generates also for magazines more identification. Identification is a strong experience factor for magazines and a better mood generates a fly-wheel effect.
Bronner, Bronner and Faasse (2007) concluded that a better mood leads to higher advertising noting scores. This study shows that mood has influence on media experience. So the results of both studies combining we can state that the causal chain from a better mood via a specific media experience to higher advertising effectiveness is plausible. How to explain these finding? One explanation is offered by the mood-congruence model based on network models of memory (Bower, 1981; Martin, 2003). Positive moods prime positive memories and negative moods prime negative memories. People in positive moods avoid disrupting those good moods. Another explanation is the model of the reduction in total cognitive elaboration (Batra & Stayman, 1990). A better mood reduces the cognitive elaboration (e.g. the generation of counter arguments) and makes people more open for mood-induced peripheral cues and images. The second explanation leads to higher advertising exposure levels because individual consumers in a positive mood are less ‘critical’ and raise less a barrier to persuasive messages. The first explanation leads to higher appreciation of advertising conveying positive feelings. Together leading to a higher advertising effectiveness.

In scheme 3, an overview of the significant relationships is presented.

<table>
<thead>
<tr>
<th></th>
<th>TV</th>
<th>newspapers</th>
<th>magazines</th>
<th>free local papers</th>
</tr>
</thead>
<tbody>
<tr>
<td>transformation</td>
<td>*</td>
<td></td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>pastime</td>
<td>*</td>
<td></td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>social interaction</td>
<td></td>
<td></td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>practical use</td>
<td></td>
<td>*</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>identification</td>
<td></td>
<td></td>
<td></td>
<td>*</td>
</tr>
</tbody>
</table>

Note: * = individuals in a positive mood have significantly higher experiences scores on this media experience dimension

Scheme 3: Summary of mood-state effects for media experience (positive mood and higher experience scores)

7 Implications

What are the consequences of these findings for advertising? Bronner and Neijens (2006) introduced the idea of the U-shaped path between medium choice and advertising
effectiveness (scheme 4a). This path leads from choosing the medium to experiencing it (‘How is the consumption of medium a experienced at moment b?’), from experiencing the medium to experiencing advertising embedded in that medium (‘How is the advertising experienced in the moment of medium consumption?’), and from advertising experience to advertising effectiveness. In their study they could answer the research question ‘is there a correlation between media experience and advertising experience?’ in the affirmative. And they conclude (Bronner & Neijens, 2006, p.95): ‘This correlation between media and advertising experience thus justifies the U-shaped path philosophy that is implicitly used in the world of media placement and planning’. Now the findings in this study suggest that we have to add the mood element to the U-shaped path in scheme 4a, on the left-hand side at the beginning (see scheme 4b with the U-shaped path and the additional mood element).

Scheme 4a: The U-path between medium choice and advertising effectiveness
(Bronner & Neijens, 2006)

So, via medium experience, mood influences advertising effectiveness. But in line with a conclusion of Moorman (2003, p.10), context effects on print advertisements vary from those relating to television commercials.

What can we advise the commercial media and advertising world over viewing the results of our analysis concerning the triad mood-media experience-advertising effectiveness? The answers are different for broadcast and print media.

A television viewer in a positive mood is seeking for transformational elements and experiences transformational elements. To enhance this positive mood effect concerning TV advertising, the use of affective elements like humor or other relaxing elements seems to be a proper method (see scheme 5, last column). Television watchers in a positive mood seek for
transformational elements, see likeable humorous advertising and their mood is enhanced by these positive experienced commercial stimuli.

<table>
<thead>
<tr>
<th>Media</th>
<th>mood effects</th>
<th>elements in ads</th>
</tr>
</thead>
<tbody>
<tr>
<td>TV</td>
<td>search for mood congruence (1)</td>
<td>mainly affective (humor/relaxation)</td>
</tr>
<tr>
<td>Newspapers</td>
<td>behavioral impetus (2)</td>
<td>mainly cognitive (ideas/address)</td>
</tr>
<tr>
<td>Magazines</td>
<td>mix of (1) and (2)</td>
<td>mix affective/cognitive</td>
</tr>
</tbody>
</table>

*Scheme 5: Mood and advertising*

For *newspaper readers* in a positive mood, the use of cognitive and conative elements in advertising seems more appropriate. People in a positive mood noting ads in a newspaper will be motivated to visit a dealer, retail location or a Web site to obtain additional information about the product/service/company. So the chain is: newspaper readers in a positive mood are inclined to take actions, see an ad with action elements and are as a consequence more prone to take actions in relation to the advertised brand. Either to talk about the brand with others or to phone/visit a website or a shop.

And concerning magazines, the use of a mix of these elements seems to be effective, based on the results of this study. *Readers of magazines* in appositive mood are more prone to take actions but are also seeking for transformational elements. Humor and action elements need to be present in the ad.

So these findings have practical marketing implications. But of course further research is necessary to explain the difference in context between broadcast and print.

*Note:* in the Dutch Media Experience Monitor, we have also data about the advertising experience within the moment of media consumption. But only for a limited number of respondents. And the number of available observations is too low to relate mood and advertising experience.

About the authors

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## Appendix: tables

### Table 1: Significant relations between mood and TV experience

<table>
<thead>
<tr>
<th></th>
<th>information**</th>
<th>transformation***</th>
<th>pastime****</th>
<th>n=</th>
</tr>
</thead>
<tbody>
<tr>
<td>negative mood (1)</td>
<td>24.4</td>
<td>23.9</td>
<td>7.2</td>
<td>62</td>
</tr>
<tr>
<td>neutral (2)</td>
<td>20.6</td>
<td>30.9</td>
<td>21.3</td>
<td>768</td>
</tr>
<tr>
<td>positive mood (3)</td>
<td>14.6</td>
<td>34.8</td>
<td>24.7</td>
<td>103</td>
</tr>
<tr>
<td>total</td>
<td>20.2</td>
<td>30.9</td>
<td>20.7</td>
<td>933</td>
</tr>
</tbody>
</table>

* average scores on the dimensions min = 0 … max = 100

** F(2,929) = 3.09, P<.05; LSD: (1) versus (3) and (2) versus (3) differ at P<.05; Bonferroni (1) vs (3)

*** F(2,929) = 2.90, P<.05; LSD: (1) vs (3) differs at P<.05; Bonferroni same results

**** F(2,929) = 4.05, P<.05; LSD: (1) vs (3) and (1) vs (2) differ at P<.05; Bonferroni same results

### Table 2: Significant relations between mood and newspaper experience

<table>
<thead>
<tr>
<th></th>
<th>social interaction**</th>
<th>practical use ***</th>
<th>n=</th>
</tr>
</thead>
<tbody>
<tr>
<td>negative mood (1)</td>
<td>27.3</td>
<td>8.1</td>
<td>31</td>
</tr>
<tr>
<td>neutral (2)</td>
<td>40.7</td>
<td>8.7</td>
<td>582</td>
</tr>
<tr>
<td>positive mood (3)</td>
<td>52.6</td>
<td>21.9</td>
<td>62</td>
</tr>
<tr>
<td>total</td>
<td>41.1</td>
<td>9.9</td>
<td>676</td>
</tr>
</tbody>
</table>

* average scores on the dimensions min = 0 … max = 100

** F(2,672) = 2.98, P<.05; LSD: (1) versus (3) differs at P<.05; Bonferroni same results

*** F(2,672) = 8.68, P<.05; LSD: (1) vs (3) and (2) vs (3) differ at P<.05; Bonferroni same results

### Table 3: Significant relations between mood and magazine experience

<table>
<thead>
<tr>
<th></th>
<th>transformation**</th>
<th>identification***</th>
<th>practical use****</th>
<th>n=</th>
</tr>
</thead>
<tbody>
<tr>
<td>negative mood (1)</td>
<td>22.7</td>
<td>8.0</td>
<td>6.4</td>
<td>24</td>
</tr>
<tr>
<td>neutral (2)</td>
<td>36.5</td>
<td>14.2</td>
<td>16.7</td>
<td>431</td>
</tr>
<tr>
<td>positive mood (3)</td>
<td>45.6</td>
<td>21.8</td>
<td>28.2</td>
<td>59</td>
</tr>
<tr>
<td>total</td>
<td>36.9</td>
<td>14.8</td>
<td>17.6</td>
<td>514</td>
</tr>
</tbody>
</table>

* average scores on the dimensions min = 0 … max = 100

** F(2,510) = 5.39, P<.05; LSD: (1) vs (2) and (2) vs (3) and (1) vs (3) differ at P<.05; Bonferroni (1) vs (3)

*** F(2,510) = 3.43, P<.05; LSD: (1) vs (3) and (2) vs (3) differ at P<.05; Bonferroni (1) vs (3)

**** F(2,510) = 7.10, P<.05; LSD: (1) vs (3) and (2) vs (3) differ at P<.05; Bonferroni same results

### Table 4: Significant relations between mood and free local paper experience

<table>
<thead>
<tr>
<th></th>
<th>pastime**</th>
<th>n=</th>
</tr>
</thead>
<tbody>
<tr>
<td>negative mood (1)</td>
<td>18.0</td>
<td>24</td>
</tr>
<tr>
<td>neutral (2)</td>
<td>32.9</td>
<td>371</td>
</tr>
<tr>
<td>positive mood (3)</td>
<td>53.8</td>
<td>45</td>
</tr>
<tr>
<td>total</td>
<td>34.3</td>
<td>440</td>
</tr>
</tbody>
</table>

* average scores on the dimensions min = 0 … max = 100

** F(2,436) = 5.44, P<.05; LSD: (1) vs (3) and (2) vs (3) differ at P<.05; Bonferroni same result
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