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A word-stem completion task to assess implicit processing of appearance-related information

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Abstract

Objective: This paper reports on the development and utility of a new implicit measure of appearance-related information processing. **Methods:** A 20-item word-stem completion task was constructed, in which each word stem could be completed with either an appearance-related word or at least one non-appearance alternative. The measure was tested in four different experiments, most investigating the impact of acute exposure to media-portrayed thin idealised female images. **Results:** Exposure to media images or other appearance-related material led to the generation of more appearance-or weight-related words in both female and male samples. **Conclusion:** It was concluded that the word-stem task has empirical utility as a simple, self-paced and sensitive outcome measure in experimental studies of media exposure. We conceptualise the word-stem task as a measure of appearance- and weight-schema activation.

Keywords: Appearance schemas; Word stems; Media; Cognitive processing

Introduction

As the single most powerful transmitter of sociocultural ideals, in particular of the current unrealistically thin beauty ideal for women, the mass media are often held at least partly responsible for the high rates of body dissatisfaction and eating disorders in western societies [1]. One important source of empirical evidence confirming the link between media exposure and body dissatisfaction comes from experimental studies of the impact of acute exposure to media-portrayed images of attractiveness. A recent meta-analysis concluded that exposure to thin ideals had a small but relatively consistent negative effect on body image, but that not all women are equally vulnerable [2].

These effects of media exposure can be analysed in terms of cognitive-processing models of body image and eating disturbance [3–6]. Based on self-schema theory [7], such models argue that individuals develop appearance-related schemas, which are cognitive structures concerning appearance, that organise and determine the processing of self-relevant information. Exposure to schema-relevant information such as thin attractive models in the media then primes or activates the appearance schemas, which, in turn, have cognitive–affective processing consequences, such as changes in mood or body dissatisfaction [3]. While virtually everyone develops a basic appearance-related schema [8], there are individual differences in the complexity and elaboration of these schemas. Some individuals, known as appearance schematics, for whom appearance is crucial and integral to their self-concept, will selectively attend to and be more responsive to the appearance-related aspects of any presented material. Two studies have confirmed that appearance-schematic women suffered greater negative consequences of media exposure than did their aschematic peers [9,10]. Thus, this application of schema theory offers both a mechanism by which media leads to body dissatisfaction (schema activation), and an explanation of why some individuals are more vulnerable than others (appearance schematicity).

There are a number of existing measures of individual differences in appearance (or body shape and weight) schematicity. These include self-ratings [8], card sorting [11], ambiguous sentences [12], and ambiguous scenarios [13]. Most commonly, however, the modified Stroop has been

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used to demonstrate information-processing biases in patients with eating disorders [14,15] and in chronic dieters [16,17]. The selective processing of information related to eating, weight or shape, as indicated by slower colour naming of such words in these studies, has been taken as evidence for the existence and operation of eating-disordered or weight schemas [18]. More recently, a self-report Appearance Schemas Inventory has been developed which correlates with modified Stroop performance [8,19].

There has been less focus on underlying processes. A recent call has sought a better understanding of the mechanisms by which women's feelings about their bodies are influenced by social or media messages, with a closer examination of automatic and controlled processing [20]. In particular, there has as yet been little attempt to demonstrate that media exposure does in fact activate appearance schemas. The procedures listed above provide an indication of stable traitlike differences in the existence and elaboration of schemas between individuals. But measures of such stable individual differences cannot provide evidence of acute changes in schema activation consequent upon media exposure, nor can they provide evidence for tests of the proposed mechanism linking media images and body dissatisfaction.

The major requirement for the assessment of schema activation in response to media exposure is that the measure should be a reactive one, responsive to environmental contingencies. Thus, the test of the measure's empirical validity lies in the obtaining of higher scores (more schema activation) under experimental exposure to appearance-related information than to non-appearance-related information. In fact, a few investigators have used the modified Stroop in this way. Greater Stroop interference (more schema activation) has been found following a high-calorie preload, especially for restrained eaters [16,21] and following a prime by being weighed in front of a mirror for appearance schematics [19]. The Stroop test, however, is somewhat unwieldy in that it requires considerable equipment and can only be individually administered. Thus, a second criterion for an ideal measure is that it be simple, short and easily group-administered.

Because schema activation is an automatic process that takes place without any conscious awareness, its assessment should tap implicit rather than explicit processing. Thus, a third criterion for its successful assessment is that the measure should be indirect and nonobvious (as is the modified Stroop). Thus far, experimental studies of media effects have been plagued by large demand characteristics associated with the use of very obvious outcome measures of body dissatisfaction or negative mood. To redress this, investigators have needed to construct elaborate cover stories [20] or present their study as two different experiments [22]. A variety of indirect measures have been used to assess other implicit processes, especially those involving potentially negative social evaluations. For example, the activation of racial stereotypes has been assessed by word fragments [23] and by differences in response latency to group-attribute pairings (Implicit Association Test) [24].

Thus, we present a new task designed to measure implicitly the consequences of exposure to appearance-related material in general, and to media images of the thin female ideal in particular. We conceptualise it as a measure of appearance- and weight-schema activation. The task we propose is a word-stem completion task in which participants complete a series of word stems with the first word to come to mind. As an implicit task, it circumvents some of the difficulties of the more obvious traditional outcome measures. Further, unlike many measures of cognitive processing, the task is simple, straightforward, requires no specialised equipment and can be group-administered.

Our aim here is to demonstrate the empirical utility of our procedure for assessing schema activation. This will be demonstrated if exposure to a range of appearance- or weight-related stimuli (including media images) leads to the increased production of appearance- or weight-related words in the word-stem completion task.

Method

Construction of the task

The construction of the word-stem task was based on the simple rationale that individuals will produce more appearance-related words when their appearance schemas have been activated than when they have not. An initial pool of over 200 words covering general and weight-related appearance was generated using a thesaurus. With the aid of a dictionary, this was reduced to 45 three-letter word stems, which could be completed to form both an appearance-related word, and at least one reasonably high frequency alternative word that is not related to appearance. For example, the word stem PRE_ could be completed as *pretty* (appearance-related) or *present* or *preview* (nonappearance related). To determine the most appropriate word stems for inclusion, this set of 45 word stems was piloted on a sample of 36 adolescents (21 females and 15 males) with a mean age of 16.4 years.

On the basis of this trial, 20 word stems were selected for inclusion in the final task according to the following criteria: (1) at least one appearance word was generated; (2) the appearance word was generated by fewer than 50% of participants; (3) any single nonappearance word was generated by fewer than 50% of participants; (4) the number of noncompletions of the word stem was less than 4; and (5) there was complete interrater agreement between two raters regarding whether the generated word was appearance-related. Thus, the final set of 20 items was selected to elicit a range of responses and to minimise ambiguities. The items were arranged in random order.

Description of the word-stem completion task

The entire task is presented in Appendix. Participants are asked simply to ''Please complete the following word stems

with whatever word comes to your mind first''. They are then presented with two examples and the list of 20 word stems to be completed. The task is self-paced and typically takes approximately 5 min.

Scoring

Scoring is carried out by categorizing each word as an appearance or nonappearance word, and then summing the number of appearance-related words generated (out of 20). Examples of both appearance and nonappearance words are provided in Table 1, along with the frequency count per million words [25].

In one study [9], the responses of a subsample of 60 participants (i.e., 1200 individual word-stem completions) were scored by two independent raters. Perfect agreement between the raters was reached for each of the 60 respondents for 11 word stems, disagreement about only 1 case out of 60 (1.7%) for seven word stems and disagreement about 2 (3.3%) and 4 (6.7%) cases for the remaining two word stems.

Participants and brief procedures

We have now included the word-stem completion task as an outcome measure in a number of different experiments addressing different questions, but all broadly concerned with the impact of medialike messages on mood and body dissatisfaction. Here, we draw together the word-stem completion results from these studies (two published data sets, plus data from two new studies). In each experiment, the manipulation consisted of the presentation of appearance stimuli (appearance condition) or nonappearance stimuli (control condition). For each experiment we briefly describe the participants, stimulus materials, and procedures insofar as they are relevant to the word-stem task. Most of the studies also involved other experimental manipulations, e.g., instructional set, and other outcome variables, e.g., negative mood, which we do not detail here. The adolescent participants were recruited from high schools in metropolitan Adelaide, the capital city of South Australia. All undergraduate participants were students at the Flinders University of South Australia.

Table 1
Examples of words for word-stem completion task (frequencies per million in parentheses)

Order	Word stem	Appearance word (frequency)	Nonappearance word (frequency)
1	PRE	Pretty (100+)	Present (100+)
2	CAL	Calorie (4)	Call (100+)
3	BIN	Binge	Bins (39)
4	SCA	Scale(s) (50–100)	Scare (37)
5	GOR	Gorgeous (17)	Gorilla (3)
6	DIE	Diet (27)	Died (100+)
7	THI	Thigh(s) (13)/Thin (100+)	This (100+)
8	SLE	Slender (33)	Sleep (100+)
9	PLU	Plump (14)	Plunge (43)
10	SLI	Slim (14)	Slipper (20)
11	SKI	Skinny (2)	Skill (39)
12	HAN	Handsome (50–100)	Hand (100+)
13	BLO	Blond(e) (17)	Blow (100+)
14	GRO	Gross (15)	Grow (100+)
15	OBE	Obesity (1)	Obey (50–100)
16	PET	Petite (2)	Pets (26)
17	CHE	Chest (41)	Cheap (50–100)
18	MUS	Muscle/cular (45)	Music (100+)
19	CEL	Cellulite(ose) (2)	Cell (50–100)
20	WAI	Waist (33)	Wait (100+)

Experiment 1

Participants in this experiment were 752 adolescents (352 females, 400 males) aged 13–17 years (from two previous studies [9,26]). All students watched a 10-min segment of either 20 appearance-related television commercials containing images of women who epitomise the current thin ideal (appearance condition) or 20 non-appearance-related commercials (control condition). Immediately following the commercials, participants completed brief visual analogue scales of mood and body dissatisfaction, followed by the word-stem completion task.

Experiment 2

Participants were 84 female undergraduate students, with a mean age of 20.2 years [27]. Participants watched a 15-min video-tape containing seven recent music video-clips. In the appearance condition, six of the seven video clips emphasized female thinness and attractiveness, while none of the clips in the nonappearance (control) condition did. After watching the video clips, participants completed a brief set of visual analogue scales, followed by the word-stem completion task.

Experiment 3

Participants were 132 first year psychology students (80 women, 52 men) with a mean age of 23.1 years. Half the participants completed the word-stem task first (control condition), while the other half (appearance condition) completed the task after completing the Appearance Schemas Inventory [4] and self-reporting height, weight, ideal weight and appearance satisfaction. Although the word-stem task was designed for research examining the impact of media images on body image, as a measure of appearance-schema activation it should be similarly responsive to other kinds of appearance-related cues.

Experiment 4

Participants were 155 first year psychology students (117 women, 38 men) with a mean age of 23.3 years. In this experiment, the word-stem task was split into two 10-item halves on the basis of equivalent frequency of appearance words. All students completed one 10-item word-stem task initially, followed by another questionnaire, followed by the other 10-item word-stem task. For half the students (appearance condition), the intervening questionnaire concerned

views about appearance. For the other half, the intervening questionnaire was about statistics (control condition). The order of presentation for the short forms of the word-stem task was counter-balanced across conditions.

Results

Word-stem completion results for females

Table 2 presents the scores for women and girls on the word-stem task for the appearance and control conditions as these have been defined across the various specific experimental protocols. Only the difference between appearance and control conditions has been tested for statistical significance, ignoring all other experimental manipulations.

The results indicate that in general the measure is responsive to the various appearance manipulations. We obtained significant differences between the appearance and control conditions for Experiments 1 through 3. Further, although the tabled postexposure measures did not differ in the remaining experiment (Experiment 4), when change from preexposure score was calculated, there was also a significant difference between appearance ($M = 1.24$) and control ($M = 0.28$) conditions, $t(115) = 2.69$, $P < .01$. Exposing women and girls to media-type images of thin ideals in a variety of contexts, as well as asking them to report or reflect on their own body size, weight and appearance, does lead to the production of more appearance or weight-related words, which we interpret as evidence of schema activation. Note that it is still the minority of words which are on average appearance or weight-related (means range from 4.67 to 6.43 out of 20), suggesting that participants have not consciously chosen appearance words.

Table 2
Mean (S.D.) number of appearance words produced by females in control and appearance conditions

			Condition	
Experiment	Participants	Experimental manipulation	Control	Appearance
1	Adolescents	Television commercials	3.18 (2.10)	4.67*** (2.46)
2	Undergraduate	Music video clips	4.71 (3.20)	6.43* (3.74)
3	Undergraduate	Self-reporting on appearance	3.85 (2.19)	5.98** (3.97)
4	Undergraduate	Self-reporting on appearance (out of 10)[a]	2.25 (1.56)	2.67 (1.94)

[a] Because only half the test was completed, these scores are out of 10, rather than 20.
* $P < .05$.
** $P < .01$.
*** $P < .001$.

Table 3
Mean (S.D.) number of appearance words produced by males in control and appearance conditions

			Condition	
Experiment	Participants	Experimental manipulation	Control	Appearance
1	Adolescents	Television commercials	2.29 (1.49)	2.83** (2.10)
3	Undergraduate	Self-reporting on appearance	2.64 (1.45)	3.86* (2.37)
4	Undergraduate	Self-reporting on appearance[a]	1.67 (1.05)	2.11 (1.23)

[a] Score out of 10.
* $P < .05$.
** $P < .01$.

Word-stem completion results for males

In those experiments which included men or boys, the scores are generally a little lower than for their female counterparts. However, Table 3 shows that men and boys also demonstrate a similar responsiveness to appearance-related material.

Discussion

The purpose of this paper is to present a new non-obtrusive outcome measure for use in experiments of the effects of media thin ideals or other appearance information. We conceptualise it as a measure of appearance- and weight-schema activation. The word-stem task presented here is simple, short, and unlike other measures of cognitive processing (e.g., the modified Stroop), requires no training or complex equipment. Participants report that they find it interesting. It can be individually or group administered and is self-paced. Further, the measure is clearly a reactive one, responsive to environmental contingencies, as required in its initial conception. It is this which makes it particularly attractive for experimental studies of media effects.

The results demonstrate that the measure has empirical utility. Exposure to thin ideals as presented in the media or to other appearance-related material does lead to the completion of word stems with more appearance- or weight-related words. Nevertheless, the effects are sufficiently subtle (4 to 7 out of 20 for women) that clearly participants are not deliberately presenting appearance-related words. The variety in experimental procedures reduces the possibility that participants are simply responding with specific words they have recently read or heard, i.e., treating the task as an implicit memory task. In the study of music video clips, for example, it is unlikely that any of the potential word completions had appeared. Future research might usefully correlate scores on the word-stem task with other measures of appearance processing, e.g., modified Stroop performance.

In those studies, which involved both male and female participants, the number of appearance words generated by men was always a little lower than that generated by women, irrespective of experimental condition. This accords with the general observation that women report more cognitive–behavioural investment in their appearance (i.e., they are more appearance-schematic) than men [28]. Although the specific experiments are not directly comparable because of their differing protocols, the data also suggest that older participants may produce more appearance words than do adolescents. Future studies might explicitly compare the word-stem completion performance of participants of different ages in response to the same stimulus materials.

It is important to note that the measure is not directed solely at negative weight or shape-related words. Many of the potential word completions are both positive and broader in application (e.g., ''pretty'', ''gorgeous'', ''handsome''). We wished to access the activation of more broadly based appearance-related schemas. In principle (if not in practice for women in western societies), it should be possible for environmental primes such as media images to activate appearance schemas without necessarily any negative consequence, e.g., on body dissatisfaction. In fact, this is precisely what was found for boys in the study, which addressed this question (Experiment 1, [9,26]). We believe such a dissociation between appearance schema activation (as measured here by the word-stem task) and state body dissatisfaction (as measured by traditional measures) to confer a number of advantages. First, it confirms that the word-stem completion task is not simply a surrogate measure of body dissatisfaction. Second, it demonstrates an empirical distinction between processes that are conceptualised as separate in our theorising about media effects. Finally, it appears that the word-stem completion task may provide a more sensitive and responsive measure to media-portrayed images than other more typical outcome measures (e.g., visual analogue scales to measure body dissatisfaction).

Of course the measure does have some limitations. It rests on participants having the vocabulary and cognitive capacity to complete the word stems. Some adolescents did have difficulty thinking of some words, although on average less than 1 word stem out of 20 was left unfilled (mean missing items = 0.77 for girls, and 0.88 for boys). For undergraduates, the numbers of missing items were fewer (means 0.01–0.40 for women, 0.36–0.42 for men). Although students sometimes produce misspellings, these are not problematic in that they can be scored in exactly the same way as correctly spelled words. Finally, participants could produce novel words that are ambiguous with respect to their appearance status, but given the initial construction of the task to eliminate such cases, these were relatively few in number.

Notwithstanding these limitations, and the fact that the precise properties of the task have not yet been extensively studied, the word-stem completion task does seem a simple, relatively unambiguous, implicit test of the effects of exposure to media-portrayed or other forms of attractiveness information. Although it undoubtedly requires further development and refinement, we would welcome other media researchers, especially those employing cognitive-processing frameworks, to test it with their experimental protocols. Its use as an outcome measure might also usefully be extended to other sorts of experimental manipulations, e.g., tests of the effectiveness of clinical interventions, and to clinical samples such as patients with eating disorders.

Appendix

Please complete the following word stems with whatever word comes to your mind first.

For example;
EXA____ → EXAmple or EXAmination or EXA. . .
FRE____ → FREeze or FREe or FRE. . .

1. PRE_____	11. SKI_____
2. CAL_____	12. HAN_____
3. BIN_____	13. BLO_____
4. SCA_____	14. GRO_____
5. GOR_____	15. OBE_____
6. DIE_____	16. PET_____
7. THI_____	17. CHE_____
8. SLE_____	18. MUS_____
9. PLU_____	19. CEL_____
10. SLI_____	20. WAI_____

References

[1] Levine MP, Smolak L. Media as a context for the development of disordered eating. In: Smolak L, Levine MD, Striegel-Moore R, editors. The developmental psychopathology of eating disorders: implications for research, prevention and treatment. Mahway (NH): Erlbaum, 1996. pp. 235–57.
[2] Groesz LM, Levine MP, Murnen SK. The effect of experimental presentation of thin media images on body satisfaction. Int J Eat Disord 2002;31:1–16.
[3] Altabe M, Thompson JK. Body image: a cognitive self-schema construct? Cogn Ther Res 1996;20:171–93.
[4] Cash TF, Labarge AS. Development of the Appearance Schemas Inventory: a new cognitive body-image assessment. Cogn Ther Res 1996;20:37–50.
[5] Tantleff-Dunn S, Thompson JK. Body image and appearance-related feedback: recall, judgment, and affective response. J Soc Clin Psychol 1998;17:319–40.
[6] Waller G, Barnes J. Preconscious processing of body image cues. J Psychosom Res 2002;53:1037–41.
[7] Markus H. Self-schemata and processing information about the self. J Pers Soc Psychol 1977;35:63–78.
[8] Markus H, Hamill R, Sentis KP. Thinking fat: self-schemas for body weight and the processing of weight relevant information. J Appl Soc Psychol 1987;17:50–71.

[9] Hargreaves DA, Tiggemann M. The effect of television commercials on mood and body dissatisfaction: the role of appearance-schema activation. J Soc Clin Psychol 2002;21:328–49.
[10] Lavin MA, Cash TF. Effects of exposure to information about appearance stereotyping and discrimination on women's body images. Int J Eat Disord 2001;29:51–8.
[11] Showers CJ, Larson BE. Looking at body image: the organization of self-knowledge about physical appearance and its relation to disordered eating. J Pers 1999;67:659–700.
[12] Jackman LP, Williamson DA, Netemeyer RG, Anderson DA. Do weight-preoccupied women misinterpret ambiguous stimuli related to body size? Cogn Ther Res 1995;19:341–55.
[13] Cooper M. Bias in interpretation of ambiguous scenarios in eating disorders. Behav Res Ther 1997;35:619–26.
[14] Ben-Tovim DL, Walker MK. Women's body attitudes: a review of measurement techniques. Int J Eat Disord 1991;10:155–67.
[15] Cooper MT, Fairburn CG. Thoughts about eating, weight and shape in anorexia and bulimia nervosa. Behav Res Ther 1992;30:501–11.
[16] Mahamedi F, Heatherton TF. Effects of high calorie preloads on selective processing of food and body shape stimuli among dieters and nondieters. Int J Eat Disord 1993;13:305–14.
[17] Perpiña C, Hemsley D, Treasure J, De Silva P. Is the selective information processing of food and body words specific to patients with eating disorders? Int J Eat Disord 1993;14:359–66.
[18] Vitousek KB, Hollon SD. The investigation of schematic content and processing in eating disorders. Cogn Ther Res 1990;14:191–214.
[19] Labarge AS, Cash TF, Brown TA. Use of a modified Stroop task to examine appearance-schematic information processing in college women. Cogn Ther Res 1998;22:179–90.
[20] Henderson-King TA, Henderson-King E, Hoffmann L. Media images and women's self evaluations: social context and importance of attractiveness as moderators. Pers Soc Psychol Bull 2001;27:1407–16.
[21] Ogden J, Greville L. Cognitive changes to preloading in restrained and unrestrained eaters as measured by the Stroop task. Int J Eat Disord 1993;14:185–95.
[22] Posavac H, Posavac SS, Weigel RG. Reducing the impact of media images on women at risk for body image disturbance: three targeted interventions. J Soc Clin Psychol 2001;20:324–40.
[23] Gilbert DT, Hixon JG. The trouble of thinking: activation and application of stereotypic beliefs. J Pers Soc Psychol 1991;60:509–17.
[24] Greenwald AG, McGhee DE, Schwartz JLK. Measuring individual differences in implicit cognition: the implicit association test. J Pers Soc Psychol 1998;74:1464–80.
[25] Thorndike GL, Lorge I. The teacher's word book of 30,000 words. New York: Teachers College Press, 1944.
[26] Hargreaves DA, Tiggemann M. The effect of ''thin ideal'' television commercials on body dissatisfaction and schema activation during early adolescence. J Youth Adolesc 2003;32:367–73.
[27] Tiggemann M, Slater A. Thin ideals in music television: a source of social comparison and body dissatisfaction. Int J Eat Disord 2004;35:48–58.
[28] Cash TF, Melnyk SE, Hrabosky JI. The assessment of body-image investment: an extensive revision of the Appearance Schemas Inventory. Int J Eat Disord 2004;35:305–16.