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Do Unsuccessful Dieters Intentionally Underreport Food Intake?

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Abstract: **Objective:** *A bogus pipeline paradigm was utilized to assess whether food intake underreporting by unsuccessful dieters is intentional.* **Method:** *Twenty-eight subjects completed 1-week food diaries. Then, 17 subjects in the experimental condition kept 2-week food diaries while being told the researcher was verifying their report. Eleven subjects in the control group were asked merely to self-monitor for two more weeks.* **Results:** *Results indicate that subjects in the experimental group reported significantly greater intake than control subjects, when controlling for reported intake during the screening phase and weight change.* **Discussion:** *Thus, the belief that the researcher could verify their report improved the accuracy of patients' self-report. However, all subjects continued to underreport their dietary intake. In summary, underreporting may be an intentional attempt to manage presentation to others in a society that is increasingly critical of overweight persons. © 1998 by John Wiley & Sons, Inc.* Int J Eat Disord 24: 259–266, 1998.

Key words: *self-report; dietary intake; underreporting*

INTRODUCTION

The doubly labeled water (DLW) method (Schoeller & van Santen, 1982) has made it possible to measure caloric intake without relying on self-report. Numerous studies have demonstrated that obese persons consume more calories than the nonobese, and that

This study was conducted as part of a dissertation by the first author. G. Terence Wilson, Ph.D., served as chairperson.

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many persons substantially underreport their caloric intake. One national study estimated that 31% of over 11,000 adults were underreporting dietary intake (Klesges, Eck, & Ray, 1995). Furthermore, some ''diet-resistant obese'' (those who reported an inability to lose weight despite self-reported caloric intakes significantly below normal weight maintenance levels) report consuming only 50% of their measured energy expenditure (Lichtman et al., 1992). Non-diet-resistant obese report only 60 to 80% of their measured energy expenditure (Bandini, Schoeller, Dyr, & Dietz, 1990; Prentice et al., 1986). In contrast, nonobese persons typically report approximately 80 to 100% of their measured energy intake (Black et al., 1993).

Although underreporting has been well documented, underlying mechanisms have not been adequately investigated. To date, no evidence has been found to implicate perceptual distortion (Blake, Guthrie, & Smiciklas-Wright, 1989; Lichtman et al., 1992), inadequate education (Howat et al., 1994; Heymsfield et al., 1995), or memory problems (Heymsfield et al., 1995). Several authors have described psychological motivations for underreporting. For example, Mertz et al. (1991) concluded that underreporting was ''most probably subconscious, motivated by the belief, widespread in our society, that maintaining a low body weight contributes to good health and that eating less will have beneficial effects'' (p. 292).

Socially desirable responding is the tendency to give answers that make the respondent appear in a favorable light (Paulhus, 1991). Researchers (Paulhus, 1986, 1989, 1991; Sackeim & Gur, 1979) commonly divided socially desirable responding into two components: self-deception, distorting information primarily for oneself, and impression management, presenting a favorable image to other people (Roth, Snyder, & Pace, 1986). In practice, self-deception would mean convincing oneself that one had eaten less than actually consumed for the purpose of maintaining self-esteem, while impression management would be the more deliberate manipulation of self-report to present a favorable view to others.

One approach for addressing socially desirable responding is to alter the situational demand for desirable responding through a ''bogus pipeline'' (Jones & Sigall, 1971). In this approach, the subject is told that a device is capable of detecting their ''true'' responses. Therefore, the participants are led to believe that the device will detect a lie (Aguinis, Pierce, & Quigley, 1993). The assumption is that participants will be motivated to try to report more accurately. Bogus pipelines are believed to alter primarily impression management while having less impact on self-deception.

Food intake can, in fact, be accurately measured by the DLW method. However, no studies have used the bogus pipeline paradigm to examine whether participants' knowledge of the possibility of such validation would increase the accuracy of self-reported caloric intake. Using a similar paradigm, Heymsfield et al. (1995), found that participants were more accurate in their self-report on a test meal (86% of actual intake) when their report could be independently verified, than they were over a 2-week period of dietary self-report (52% of actual intake).

This study investigated the psychological mechanisms responsible for dietary underreporting. It was hypothesized that the belief that self-reported intake would be biochemically validated would cause participants (a) to report greater caloric intake and/or to lose more weight as compared to participants who are not told that their self-monitoring would be independently verified and (b) to report greater caloric intake than they reported prior to being told their self-report would be verified.

METHOD

Participants

Participants were recruited through advertisements for a study to examine ''the psychological and physiological factors that impede weight loss.'' Participants were screened for weight stability despite reported caloric intakes of 450 kcal (2 SEEs) or more below their expected energy expenditure (calculated by regression equation; Allison, Shively, Pestone, & Heymsfield, 1995). Twenty-eight participants (5 males; 23 females) were deemed eligible and completed the entire study. Participants were between 21 and 53 years of age and with a body mass index (BMI) between 23.9 and 46.73 kg/m^2.

Materials

Participants completed food records and daily food intake was converted to calories with commercial software (N-Squared Computing, Salem, Oregon) by the first author and four trained research assistants. Coefficient of variation among nutrition data analysts was .023.

Procedure

Participants completed 1-week food diaries under standard conditions and were then randomized to either experimental or control conditions. The 17 participants in the experimental group were told the researcher would verify their intake through the use of DLW. In order to validate the energy expenditure prediction equation, 4 of the experimental participants were randomly assigned to receive true DLW (and collected additional urine samples for analysis). Accordingly, the experimental participants received a dose of either DLW or bogus water (spring water poured from DLW bottles) at the beginning of the 2-week period. They were asked to give urine samples at both the second and third appointments, which they were told would provide the biochemical validation of caloric intake. The DLW procedure was explained in common language. Participants in the control condition were given the same instructions as given during the screening phase. All participants were asked to complete 2-week food records which were returned at the third appointment. At the completion of the study, all participants were mailed their results and participants in the experimental condition were debriefed.

RESULTS

To assess the accuracy of predicted energy expenditure, predicted energy expenditure was compared to actual energy expenditure measured by DLW in the 4 DLW participants. Mean actual intake was 2,902 kcal (SD = 672) and mean predicted intake was 2,887 kcal (SD = 657), a nonsignificant difference (t = .09, p = .934). This lends confidence in the predictive ability of the regression equation.

Participants in both groups underreported their caloric intake. During the screening phase, participants in the control group reported approximately 1,400 kcal (52% of their estimated intake) and those in the experimental group reported approximately 1,522 kcal

(55% of their estimated intake). During the experimental phase, reported intake for the control group was 1,298 kcal (48% of estimated) and reported intake of the experimental group was 1,689 kcal (61% of predicted).

To determine if accuracy of reported caloric intake improved in the experimental condition, the caloric intake reported by participants who believed they received DLW was compared to that of participants in the control group using analysis of covariance (ANCOVA). All assumptions of parametric statistics (normality of residuals, homogeneity of variance, and homogeneity of regression) were met once one outlier was removed from the analysis.

The ANCOVA assessed the effect of the bogus pipeline on reported intake during the study phase both with self-reported intake during the screening phase and a square transformation of self-reported intake during the screening phase as covariates. (Since the study is questioning the validity of self-reported intake to begin with, we made no assumption that the model must be linear in the variables.) Since an alternative possible effect of the bogus pipeline was that participants would alter their eating to be more consistent with their self-report (rather than altering their self-report to be more consistent with their eating), we hypothesized that for participants in the experimental group who did not increase their reported intake, we might observe more weight loss. Hence, weight change over the experimental period was entered as an additional covariate. The effect of experimental assignment on reported intake was significant. For the total sample, $F(1,25) = 4.46$, $p = .046$). For women only, $F(1,21) = 6.00$, $p = .025$. (Results were unchanged if the outlier was included.) Data are presented in Table 1.

Finally, we compared the self-report of participants in the experimental condition during the study phase (after the introduction of the bogus pipeline) to their predicted caloric intake. The 17 participants reported a mean of 1,668 kcal, while their predicted intake was 2,760 kcal, a significant difference ($t = 6.94$, $p < .0005$), suggesting that participants were still underreporting.

DISCUSSION

The use of a bogus pipeline motivated participants to be more accurate in their self-monitoring of dietary intake. The observed increase in reported intake, although statistically significant, was not large. Participants continued to significantly underreport their caloric intake even when they believed that the researcher could check their self-reports. Thus, underreporting of dietary intake seems to be entrenched and not easily altered.

Bogus Pipeline Effect

The increase in reported intake under the bogus pipeline condition suggests that at least a portion of the underreporting initially observed was the result of impression management. This is consistent with a recent study by Turner (1995/1996) which found that 10.4% of surveyed participants admitted to having intentionally lied on self-reported food records. Deception of self and others is a common and adaptive process that plays an important role in the maintenance of both interpersonal relationships and of individual mental health (Baumeister, 1993; Taylor & Brown, 1988). In this circumstance, the deception allows dieters to escape blame from a society that values thinness and believes that overweight people are responsible for their weight problems (Crandall, 1994). Seen in this

Table 1. Analysis of covariance (ANCOVA) for bogus pipeline

Source of variance	With Outlier (28 Cases)					Without Outlier (27 Cases)				
	SS	*df*	MS	F	Significance of *F*	SS	*df*	MS	*F*	Significance of *F*
Men and women										
Main effect of bogus pipeline	655,485.67	1	655,485.67	4.04	0.056	574,676.63	1	574,676.63	4.46	0.046
Covariates	2,216,493.16	3	738,831.05	4.55	0.012	1,117,847.75	3	372,615.92	2.90	0.058
Self-reported intake Week 1	214,904.26	1	214,904.26	1.33	0.262	84,753.23	1	84,753.23	0.66	0.426
Self-reported intake 1 squared	62,713.63	1	62,713.63	0.387	0.540	161,281.97	1	161,281.97	1.25	0.275
Weight change over Time 2	266,714.00	1	266,714.00	1.644	0.213	343,821.68	1	343,821.68	2.67	0.116
Explained	3,131,318.24	4	782,829.56	4.825	0.006	2,472,235.51	4	618,058.88	4.801	0.006
Residual	3,731,809.62	23	162,252.59			2,831,965.23	22	128,725.69		
Total	6,863,127.86	27	254,189.92			5,304,200.74	26	204,007.72		
Women only										
Main effect of bogus pipeline	633,027.08	1	633,027.08	4.12	0.057	578,621.17	1	578,621.17	6.00	0.025
Covariates	1,673,772.90	3	557,924.30	3.63	0.033	1,040,224.45	3	346,741.48	3.60	0.035
Self-reported intake Week 1	157,794.08	1	157,794.08	1.03	0.324	197,298.61	1	197,298.61	2.05	0.171
Self-reported intake 1 squared	53,727.68	1	53,727.68	0.350	0.562	260,263.66	1	260,263.66	2.70	0.119
Weight change over Time 2	354,435.75	1	354,435.75	2.308	0.146	499,614.05	1	499,614.05	5.18	0.036
Explained	2,308,583.43	4	577,145.86	3.759	0.022	2,102,553.91	4	525,638.48	5.454	0.005
Residual	2,763,684.31	18	153,538.02			1,638,263.37	17	96,368.43		
Total	5,072,267.74	22	230,557.63			3,740,817.27	21	178,134.16		

Note: ANCOVA Model 4: covariates = self-report 1; self-report 1 squared; weight change over Time 2.

light, the deception is more a criticism of a condemning society than of the obese individual.

Limitations of the Methodology

Several methodological limitations may explain why the bogus pipeline did not produce a larger effect. First, the DLW paradigm may not have been sufficiently convincing. As noted by Roese and Jamieson (1993), it is important to make the method of biochemical validation impressive and credible, especially when the form of physiological assessment is relatively foreign to participants. Although an actual method of verifying dietary intake, DLW is a less familiar and perhaps, less easily comprehensible mechanism than a breathalyzer or lie detector device. Second, the protocol led participants to expect later verification for 14 days, a considerably longer period of time than is required for most bogus pipeline paradigms. Third, Aguinis et al. (1993) suggest that the bogus pipeline procedure may be more credible when described by a senior researcher rather than by a research assistant. In this study, the procedure was described by a ''junior level'' researcher. Although attempts were made to convince participants that DLW could verify their caloric intakes (such as giving them a handout and article excerpt about it), the above factors may have decreased the credibility of the bogus pipeline procedure, in turn lessening its effectiveness. Fourth, it is possible that the bogus pipeline could eliminate only a portion of impression management. That is, participants may have decided that although substantial underreporting would not go undetected, some ''minimal'' underreporting would go undetected. Or it may have been important for participants to seem consistent between their reporting during the screening phase and their reporting after the manipulation.

Finally, the generalizability of the findings may be limited as participants were all volunteers and predominantly female. To address these limitations, replication with a larger sample size, no baseline reporting period, and shorter duration of the bogus pipeline phase is recommended. Credibility of the bogus pipeline paradigm should be measured as well.

Implications

This study illustrates that unsuccessful dieters may continue to overeat, but significantly underreport their caloric intake, and that helping them to acknowledge how much they are actually consuming is no simple matter. Even when directly confronted, participants in our laboratory continued to underreport their intake and disclaim the laboratory findings. There is some evidence that patients who identify themselves as noncompliant are most likely to respond to interventions aimed at increasing adherence (Sackett, 1979). Similarly, intuition suggests that the knowledge that one is overeating may be a necessary precondition for beginning a behavioral weight loss program because in the absence of obvious overeating it is more difficult to identify foods and behaviors to reduce or eliminate.

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