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The Influence of Health Literacy on Reach, Retention, and Success in a Worksite Weight Loss Program

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Abstract

Purpose—To examine if employee health literacy (HL) status moderated reach, retention, and weight outcomes in a worksite weight loss program.

Design—The study was a two-group cluster randomized controlled weight loss trial.

Setting—The study was conducted in 28 worksites.

Subjects—Subjects comprised 1460 employees with a body mass index >25 kg/m^2.

Interventions—Two 12-month weight loss interventions targeted diet and physical activity behaviors: incenta HEALTH (INCENT; incentivized individually targeted Internet-based intervention) and Livin' My Weigh (LMW; less-intense quarterly newsletters).

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Measures—A validated three-item HL screening measure was self-completed at baseline. Weight was objectively assessed with the Health Spot scale at baseline and 12-month follow-up.

Analysis—The impact of HL on program effectiveness was assessed through fixed-effect parametric models that controlled for individual (i.e., age, gender, race, ethnicity, income, education) and worksite fixed effects.

Results—Enrolled employees had significantly higher HL status [13.54 (1.68)] as compared to unenrolled [13.04 (2.17)]($p < .001$). This finding was consistent in both interventions. Also, HL moderated weight loss effects (beta= .66; SE= 027; p= .014) and losing > 5% weight (beta = —1.53; SE = .77; $p < .047$). For those with lower baseline HL, the INCENT intervention produced greater weight loss outcomes compared to LMW. The HL level of employees retained was not significantly different from those lost to follow-up.

Conclusion—HL influences reach and moderates weight effects. These findings underscore the need to integrate recruitment strategies and further evaluate programmatic approaches that attend to the needs of low-HL audiences.

Keywords

Health Literacy, Obesity, Randomized Controlled Trial, Employee Health, Behavioral Sciences, Prevention Research. Manuscript format: research; Research purpose: intervention testing/program evaluation; Study design: cluster randomized trial; Outcome measure: weight; Content focus: workplace; Health focus: weight control, fitness/physical activity, nutrition; Strategy: education, skill building/behavior change, incentives; Target population age: adults; Target population circumstances: all education/income level, geographic location in United States and all race/ethnicities

Purpose

Health literacy (HL) can be defined as an individual's capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions. Poor HL skills have consistently been linked with poorer health outcomes. However, the influence of participant HL status on program effectiveness is not well understood, and the literature reflects that a paucity of studies have explored how HL status moderates weight outcomes in behavioral interventions.[2–4] While the workplace is considered an ideal setting to reach participants and intervene on weight-related behaviors, there are no studies that have examined HL within this context.[5–8]

This study utilized data from a multi-worksite weight loss trial that examined the effectiveness on employee weight loss of a social ecological theory-based, individually targeted, Internet-based intervention with monetary incentives (incentaHEALTH[INCENT]) when compared to a minimal intervention with quarterly newsletters and brief health education sessions (Livin' My Weigh [LMW])[9–11]. The interventions were not developed a priori to differentially influence employee HL skills. The focus of this article and exploratory analysis is based on a simple premise that it is important to screen for participant HL status to ensure that interventions do not exacerbate health disparities by being ineffective at reaching, retaining, or impacting weight outcomes of those with lower HL. The

purpose of this secondary data analysis was to explore if HL moderated reach, retention, and 12-month weight outcomes between IN-CENT and LMW conditions.

Methods

Design

This was a two-group cluster randomized controlled trial (RCT). Using a comparative effectiveness design, 28 worksites were randomly assigned to one of two 12-month weight loss interventions: (1) INCENT or (2) LMW. The Virginia Tech Institutional Review Board approved this study, and participants provided written informed consent.

Sample

To be eligible, worksites had to have 100 to 600 employees, provide Internet access to employees, have employees located in one site with central access to a kiosk for weigh-in, and agree to conduct a brief health survey (BHS) for all employees (for detailed de scription see You et al.[10] and Almeida et al.[11]). Employee eligibility criteria included nonpregnant adults >18 years of age, a body mass index of 25 kg/m^2, not currently participating in other weight loss programs, and free from serious medical conditions.

Enrolled participants with nonmissing HL information (n =1460) were majority female (76%), with a mean age of 46.5 (610.8) years, and were 78% white and 19% African-American. Additionally, 15% had a high school education or less, and 37% earned less than $50,000 year. Health literacy ranged from 3 to 15, and the average was relatively high (13.3 6 1.95). As a cluster RCT at the worksite level, the analyses account for the clustering of employees within worksites. Demographic characteristics of the participants within worksites did not differ by condition, except that INCENT participants were on average younger (46 vs. 49 years; p <.05). Worksite participation trends suggested professional groups and small colleges were less likely to participate, while manufacturing sites and governmental agencies were more likely to participate. All analyses controlled for employee age, gender, race, ethnicity, income, and education.

Measures

Surveys were self-reported and completed using either a Web-based or paper-and-pencil format. To determine reach and eligibility, employees were asked to complete a BHS prior to initiating the program. With the exception of organizational decision makers, all other employees were blinded to the existence of a future weight loss program to be delivered at their worksite. Along with demographics, a validated three-item HL screening measure was self-reported on the BHS, in which participants rate perceptions of their HL skills on a five-point Likert scale. Items focused on the degree to which people need help in reading health care materials, have difficulty understanding written materials, and can confidently complete medical forms. Responses are summed to produce a continuous score ranging from 3 to 15, with higher scores indicating higher HL. These questions were reassessed at baseline (as not all employees completed the BHS). Weight was objectively assessed with a calibrated scale and built-in digital camera that captured the employees' image at baseline and at a 12-month follow-up.

Interventions

Both conditions focused on a balanced diet and graduated exercise program. The INCENT program included (1) daily e-mails with eating, exercise, and behavioral strategies; (2) a participant Web site with behavioral weight loss tools; (3) a kiosk to track weight and progress; and (4) quarterly monetary incentives (i.e., $1 per 1% weight loss per month). The LMW program was less-intensive, more text based, and delivered through four quarterly newsletters and four 1-hour group resource sessions using condensed versions of INCENT materials. Analysis

Using Stata 13 software (StataCorp LP, College Station, Texas), *t*-tests adjusting for clustering were used to examine the relationships between reach, retention, and HL level. Multilevel mixed-effects linear regressions examined the interactions between baseline HL and condition while controlling for baseline demographics and worksite-level random intercept effects. Outcomes included weight loss and the percent of participants that achieved a >5% weight loss For employees with missing 12-month weight outcomes, imputations were performed following the baseline observation carried forward approach. This is the straightforward imputation of replacing the missing 12-month outcome with the participant's baseline weight. We also conducted outcome analysis using other imputation methods, such as last observation carried forward and multiple imputations, and results stayed robust. Standard errors were adjusted to reflect clustering of employees within worksites.

Results

Of the 3601 eligible employees that completed the BHS, 1022 (28.4%) enrolled in an intervention. An additional 768 participants had not completed the BHS. Among employees with BHS information, those who enrolled in the study had significantly higher HL status [n= 1022, HL= 13.53 (1.68)] as compared to those who did not enroll [n= 2566, HL = 13.09 (2.03)](p <.001). This finding was consistent in both the INCENT and LMW conditions.

Among the 1790 participants, 330 observations were excluded from the analysis owing to worksite dropouts (n = 54), unavailability owing to job loss or medical issues unrelated to the intervention (n = 133), missing baseline HL (n = 39), or missing demographic information (n = 104). The HL level of those retained [n= 1384, HL = 13.32 (1.98)] was not significantly different from those lost to follow-up [n= 180, HL = 13.26 (2.04)] among the full sample (p= .67), or either of the INCENT and LMW conditions.

The main, group, and HL effects are illustrated in the Table. HL significantly moderated weight loss effects. While holding demographic characteristics constant, as baseline HL decreased by a one-unit point, INCENT increased effectiveness by 0.66 pounds (p = .01) compared to LMW, and about 1.5% more employees reached a 5% overall weight loss (p < .05). Thus, for those with lower baseline HL, INCENT produced greater weight loss outcomes compared to LMW.

Discussion

Among employees with lower base-line HL, the more intensive, Internet-and incentive-based intervention produced greater weight loss than did the comparison group. One plausible explanation is that the characteristics of LMW, including longer written materials provided on a quarterly basis (which may be similar to many employer-provided resources), are more difficult for lower-literacy participants to process. While it is not possible to identify what characteristics of the INCENT program (e.g., daily e-mails with a single motivational message and incentives) contributed to these moderation effects, this is an essential area for additional research. However, even when presented with equal opportunity to participate in a free worksite weight loss intervention, employees with lower HL skills were less likely to participate, and this was consistent across both conditions. This finding underscores the need to attend to low HL employees when developing recruitment and enrollment strategies and provides another important area for future study. Importantly, HL did not influence retention rates.

A recent systematic review that evaluated the effectiveness of HL interventions targeting disease self-management and health promotion found that only 8 of 24 trials performed a moderation analysis by HL category. The results were equivocal and found HL to be an inconsistent moderator; however, most studies used face-to-face or telephone contacts, and none used an incentive-based strategy. To address notable gaps and inconclusive findings in the literature, efforts to understand how participant HL status influences program effectiveness should be a priority. Another important area for future study is to examine how HL status influences engagement within interventions.

Limitations

Our sample had relatively high HL status owing to the worksite setting. Additionally, use of a subjective (i.e., self-rated) HL screening measure should be considered when interpreting our findings. Despite these limitations, our findings are still generalizable to similar worksite settings, and our methodology offers practical guidance to others wanting to advance recommendations to better promote HL efforts as secondary prevention strategies.[15]

Implications

Although poor HL skills have consistently been linked with poorer health outcomes, few experimental studies report on how participant and/or employee HL status moderates reach, retention, or program effectiveness. Health promotion practitioners and researchers are encouraged to integrate recruitment strategies and further evaluate programmatic approaches that attend to the needs of low HL audiences.

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SO WHAT? Implications for Health Promotion Practitioners and Researchers

What is already known on this topic?

Although poor health literacy (HL) skills have consistently been linked with poorer health outcomes, few experimental studies report on how participant HL status moderates reach, retention, and weight effects.

What does this article add?

This article promotes understanding of the influence of participant HL status on outcomes from a two-group cluster randomized controlled weight loss trial worksite intervention. Employees with lower HL skills were less likely to participate, regardless of study condition. Among employees with lower baseline HL, the more intensive, Internet- and incentive-based intervention (incen-taHEALTH[INCENT]) produced greater weight loss than the comparison group. Retention rates were not influence by HL.

What are the implications for health promotion practice or research?

To avoid exacerbation of health disparities among low-HL populations, practitioners and researchers should assess participant HL status, as well as integrate recruitment strategies and further evaluate programmatic approaches that attend to the needs of low HL audiences.

Table

Health Literacy Moderation Effects on Weight Loss and Percent Losing >5%Weight[*†]

	Weight		<5% Weight Loss, %	
Outcome	**Effect Coefficient (Robust SE)[‡]**	***p***	**Effect Coefficient (Robust SE)[‡]**	***p***
Prediction model				
Overall (n = 1460)	−0.07 (0.14)	0.635	−0.08 (0.45)	0.853
INCENTA (n = 849)	0.22 (0.13)	0.087	−0.61 (0.51)	0.236
LMW (n = 611)	−0.47 (0.25)	0.061	0.51 (0.73)	0.485
Main effect model (n = 1460)				
Group	−0.44 (0.66)	0.506	1.57 (2.14)	0.461
Health literacy	−0.07 (0.14)	0.640	−0.09 (0.45)	0.843
Moderation model (n = 1460)				
Group by health literacy[§]	0.66 (0.27)	0.014	−1.53 (0.77)	0.047

[*] INCENTA indicates incentaHEALTH; and LMW, Livin' My Weigh.

[†] Prediction and moderation findings do not change when controlling for baseline body mass index.

[‡] Mixed effect parametric models that controlled for individual (i.e., age, gender, race, ethnicity, income, education) and worksite effects.

[§] The time by group effect of health literacy on the weight loss outcome.