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Obesity Treatment in Disadvantaged Population Groups: Where Do We Stand and What Can We Do?

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Abstract

Obesity is now the second leading cause of death and disease in the United States leading to health care expenditures exceeding \$147 billion dollars. The socioeconomically disadvantaged and racial/ethnic minority groups are at significantly increased risk for obesity. Despite this, low income and minority individuals are underrepresented in the current obesity treatment literature. Additionally, weight loss outcomes for these high risk groups are well below what is typically produced in standard, well-controlled behavioral interventions and reach and access to treatment is often limited. The use of telecommunications technology may provide a solution to this dilemma by expanding dissemination and allowing for dynamic tailoring. Further gains may be achieved with the use of material incentives to enhance uptake of new behaviors. Regardless of what novel strategies are deployed, the need for further research to improve the health disparities associated with obesity in disadvantaged groups is critical. The purpose of this manuscript is to review the weight loss intervention literature that has targeted socioeconomically disadvantaged and racial/ethnic minority populations with an eye toward understanding outcomes, current limitations, areas for improvement and need for further research.

Introduction

In the U.S., the prevalence of overweight (BMI 25-29.9) and obesity (BMI 30) remains a serious public health problem. Obesity and overweight are related to the development of a number of chronic disease conditions with an estimated cost to the U.S. healthcare industry currently exceeding 7% of all health expenditures (Thompson & Wolf, 2001). Obesity has become the second leading preventable cause of disease and death in the United States, secondary only to tobacco use (US Department of Health and Human Services, 2001). While an estimated 1 in 3 US adults are obese (Ogden, et. al., 2012), the socioeconomically disadvantaged and racial/ethnic minority populations are at vastly increased risk (Ogden, et

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al., 2010). Data from NHANES, BRFSS and the Add Health study show large racial/ethnic differences in obesity, especially for women (Wang & Beydoun, 2007). Additionally, low socioeconomic status (SES) is an independent risk factor for overweight and obesity, particularly also in women (Flegal et al., 2012; National Center for Health Statistics, 2007). When obesity rates are categorized by SES (generally measured by income and education), there is a trend such that less educated women are more likely to be obese compared to women with college degrees (Ogden et al., 2010). Likewise when income and obesity rates are compared, women with incomes <200% of poverty had higher rates of obesity than those 200% of poverty or higher (National Center for Health Statistics, 2007). All together, these data show the high risk for obesity particularly in low-income women. This high risk status has not, however, translated into greater research focus. In general, women are well represented in the weight loss and weight loss maintenance literature (The Diabetes Prevention Program Research Group, 2002; Wing, et al., 2004; Svetkey, et al., 2003; Appel, et al., 2003; Turk, et al., 2009; Martin, et al., 2008; Perri, et al., 2008), but seldom are low-income groups targeted. As a result, there is very little evidence on how to efficiently and effectively promote and maintain weight loss for this high risk population (Kumanyika, 2008). This is true even though there is an otherwise expanding literature on obesity treatment. Achieving reductions in obesity rates for low-income and minority women is, therefore, of critical importance in lowering high obesity related social and healthcare costs, morbidity and mortality. Evidence suggests that lifestyle changes that produce even modest, sustained weight loss produce clinically meaningful health benefits and that greater weight losses can produce greater benefits. Sustained weight loss of as little as 3 to 5% is likely to result in clinically meaningful reductions in triglycerides, blood glucose and glycated hemoglobin and in the risk of developing type 2 diabetes. Greater amounts of weight loss will reduce blood pressure, improve lipid levels and reduce the need for medications to control blood pressure, blood glucose and lipid levels (Jensen & Ryan, 2014) (Goldstein, 1992; Foster et al., 2009). However, in the effort to eliminate health disparities, it is important to consider that one size does not fit all. The purpose of this manuscript is to review the weight loss intervention literature that has targeted socioeconomically disadvantaged and racial/ethnic minority populations with an eye toward understanding outcomes, current limitations, areas for improvement and need for further research.

Obesity Treatment: The Gold Standard

Comprehensive lifestyle interventions for weight loss are delivered for 6 months or longer with the gold standard including on-site, high intensity (14 sessions in 6 months) treatment provided in individual or group sessions by a trained interventionist. Ideally, therapy should continue for a year or more (Jensen et al., 2013). Components of such interventions include 1) self-monitoring of diet, physical activity and body weight, 2) reducing energy intake, and 3) increasing energy expenditure (Alhassan, et al., 2008; Baker & Kirschenbaum, 1993; Wing & Phelan, 2005). Furthermore, intensive interventions should incorporate a variety of behavioral skills, including stimulus control, stress management, and problem solving which bolster individuals' ability to implement these behavioral changes across a variety of contexts and situations (Wadden, et al., 2012). This type of intensive behavioral intervention has been shown to produce clinically significant weight loss (Wadden, et al., 2005). Both the

Diabetes Prevention Program (DPP) and the Look AHEAD trial are examples of high quality behavioral weight loss interventions (Diabetes Prevention Program Research Group, 2002; Look AHEAD Research Group, 2007). Participants in lifestyle intervention arm of the DPP (45% minority) lost an average of 5.6 kg over an average follow-up of 2.8 years (Diabetes Prevention Program Research Group, 2002). The Look AHEAD trial subjects (37% minority) in the intensive lifestyle intervention lost 8.6% (8.6 kg) of their initial weight with 55% losing $\geq 7\%$ (Look AHEAD Research Group, 2007). Further analysis of the influence of demographics on weight loss showed that education and income did not predict achievement of weight loss goals in either study (Diabetes Prevention Program Research Group, 2004; Wadden, et al., 2009). However, ethnicity and race did predict outcomes in the Look AHEAD trial with African American and Hispanic subjects losing less weight than non-Hispanic whites (6.8%, 8.0% and 9.5%, respectively) (Wadden et al., 2009). Therefore, the data from these two important trials show that the influence of race, ethnicity and culture may have a more profound impact on weight loss outcomes than SES per se. Despite this, meaningful weight loss is achievable even in trials with high minority enrollment, however, these interventions have been expensive, time consuming for both participants and providers and often inaccessible, particularly for minority as well as, or including, those of low SES.

Obesity Treatment in Disadvantaged Population Groups

Few weight loss trials that have been conducted in the U.S. have involved low-income minority (African American and Latina) participants (Faucher & Mobley, 2010; Jordan et al., 2008; Mitchell et al., 2012; Bennett, et al., 2012; Samuel-Hodge, et al., 2013; Ockene, et al., 2012; Clark, et al., 2010). Most of these trials have recruited participants from community or public health clinics (Faucher & Mobley, 2010; Jordan et al., 2008; Bennett, et al., 2012; Samuel-Hodge, et al., 2013; Ockene, et al., 2012; Clark, et al., 2010) and conducted in-person intervention sessions either in individual or group settings (Faucher & Mobley, 2010; Jordan et al., 2008; Mitchell et al., 2012; Samuel-Hodge, et al., 2013; Ockene, et al., 2012; Clark, et al., 2010) with length of interventions ranging from 8 weeks to 12 months. The Be Fit, Be Well trial was an exception to this as participants were given an option of choosing web or phone interfaces. This trial was also conducted over 24 months and was, therefore, longer than many others (Bennett, et al., 2012). While one trial in Mexican American women focused solely on portion size reduction (Faucher & Mobley, 2010) the remaining studies were more typical behavioral weight loss trials where intervention delivery was done by trained professionals. In summary, the vast majority of these trials were similar in approach and utilized many of the same components as the highest quality, tightly controlled obesity treatment trials. Unfortunately, the weight loss outcomes, which ranged from 1 to approximately 3.5 kg, were well below what is expected. Generally speaking, behavioral weight loss trials have not produced 12-month outcomes greater than 3.5 kg in these high risk groups, independent of setting (clinical vs. non-clinical). (Osei-Assibey, et al., 2010). Moreover, among studies that reported on loss of percent of baseline weight, only approximately 20% of participants achieve the clinically relevant marker of 5% (Bennett, et al., 2012; Mitchell, et al., 2012). One exception to this is the study by Samuel-Hodge (2013) that reported an average loss of 3.7 kg for study completers but overall, 42% of participants achieved a 5% weight loss. Albeit better, this is

still in contrast to the Look AHEAD trial where 55% of participants lost 7% (Look AHEAD Research Group, 2007). Retention in the trials was also variable with attrition rates ranging from 6% (Ockene, et al., 2012) to 56% (Faucher & Mobley, 2010). On average this is higher than what is typically observed in other weight loss trials where follow-up at one year can be consistently in the 90% tile range (Diabetes Prevention Program Research Group, 2002; Look AHEAD Research Group, 2007; Harvey-Berino, et al., 2010)

Treatment Challenges

As stated previously, efficacy trials indicate that behavioral weight management interventions can result in clinically meaningful weight loss (Diabetes Prevention Program Research Group, 2002; Look AHEAD Research Group, 2007). Limited evidence is available however, on how to adapt these proven interventions to real world settings and diverse population groups (Akers, et al., 2010). There are a number of challenges and barriers for low income groups that are commonly cited including lack of access, transportation, resources, limited literacy, language barriers, insufficient time and childcare issues (Jordan, et al, 2008; Warner, et al., 2013; Bennett, et al., 2012). Some have also cited participant motivation as being an issue (Ferrante, et al., 2009; Ruelaz, et al., 2007). With regard to motivation, Johnston and Lordan (2013) found that high income individuals are likely to recognize their unhealthy weight status and are then subsequently more likely to attempt weight loss than lower income individuals. Therefore, motivations for weight loss may be quite different in low SES groups.

Although the studies cited above have speculated on the barriers to weight loss and weight loss treatment participation for disadvantaged population groups, there has been no formal manipulation of these factors to evaluate whether treatment outcomes can be improved. Much of the existing literature has simply attempted to develop treatment programs that address as many barriers as possible in an effort to improve weight loss. To date, this strategy has apparently failed. Novel approaches are called for.

Potential Solutions

Telecommunications Technology

One possible solution to address a number of purported barriers to weight loss in high risk populations is the use of telecommunications technology. Researchers and clinicians have capitalized on the use of technologies such as the Internet and mobile devices to deliver weight management interventions. In the only study to date that directly evaluated the difference between on-line and in-person weight loss treatment, an intensive, web-based behavioral intervention produced an average weight loss of 5.5 kgs with 52% of subjects achieving a 5% loss in 6 months which was comparable to in-person outcomes (Harvey-Berino, et al., 2010). Moreover, such platforms are attractive because they help overcome resource and access barriers encountered when delivering traditional face-to-face individual or group interventions. Consequently, these platforms may enhance our ability to produce significant and healthy change in larger segments of the obese population. The use of technology can help to eliminate barriers that prevent individuals from accessing health care services, including distance, costs, childcare concerns, and missed work time. (Costa, et al.,

2009; Noh, et al., 2010). Materials can be developed in multiple languages, at various literacy levels, and can allow for flexible access schedules. Additional reasons for Internet delivery include increased convenience for users, potential reduction of intervention costs, reducing potential isolation among users, and rapid dissemination of information to large numbers of diverse population groups (Griffiths, et al., 2006). In other words, technology can be used to easily customize and adapt interventions to suit the population group that is being targeted. Participants' education levels, language preferences, social class and cultural boundaries will come together in ways that make group and individual needs unique. Furthermore, the use of various aspects of online interventions can easily be tracked and captured allowing for an examination of utilization related to weight loss outcomes.

Unfortunately, currently the actual reach of on-line interventions is undiversified, mostly reaching participants who are female, highly educated, white and living in high income countries (Kohl, et al., 2013). This is true despite the fact that the “digital divide” is closing. Approximately 85% of adults report going on-line with few differences by minority status (86% white, 85% African American and 76% Hispanic) (Zickuhr, 2012). Seventy-six percent of those with incomes <\$30,000/year and 78% of those with high school diplomas use the Internet (Zickuhr, 2012). A Pew Internet and the American Life Project survey found the most commonly cited reason for not going on-line is “not interested” (31%) (Zickuhr, 2013). Very few individuals said the Internet was too expensive (10%) or that they just didn't know how (2%). A more significant trend can be found when examining cell phone and smart phone adoption however. Ninety-one percent of adults have cell phones and 56% have smart phones (Duggan & Smith, 2013). Groups most likely to use their cell phone as their main source of Internet access include those who are young, minorities, those who have no college experience and those living in lower income households (Duggan & Smith, 2013).

Based on this information, one could argue that eHealth interventions may have far better reach, accessibility and flexibility than is typically imagined. Currently however, poor levels of compliance and low Internet usage are recognized as issues in many on-line studies (Norman, et al., 2007; Kohl, et al., 2013). Conversely, many studies have reported that high levels of compliance and Internet usage were found to be associated with greater weight loss (Tate, et al., 2001; Wylie-Rosett, et al., 2001; Womble, et al., 2004; Digenio, et al., 2009). While it is easy to imagine strategies that would enhance and expand the diversity of participant pools, particularly if a mobile phone platform was utilized, it is harder to overcome issues of noncompliance particularly when interventions that shape behaviors necessary for weight management need to be sustained long-term.

Incentives

Addressing obesity among the underserved will require interventions that reach large numbers of people and have the capability of allowing for the tailoring necessary to reduce barriers specific to different population groups. Novel strategies are necessary however, to improve uptake and sustain utilization of these programs, particularly in the area of obesity management. One strategy for shaping behavior that is receiving considerable attention is the use of material incentives. Some research shows that in some areas of health care,

modest financial incentives can substantially affect the behaviors of the relatively poor (Oliver, 2009). Based on operant conditioning, incentives have been used to increase the frequency of healthy behaviors (i.e., positively reinforcing “good” behavior). Material incentives can be a source of motivation and therefore may be particularly effective for individuals who have relatively little intrinsic motivation to initiate behaviors that foster weight loss or participate in a weight loss program. A continuous reinforcement schedule (where a reward is administered after every occurrence of the behavior) is more effective in this situation where new behaviors need to be established (Ferster & Skinner, 1957). With regard to sustaining behaviors, introducing variety in the reinforcement schedule (variable ratio scheduling) can buffer against habituation and facilitate repetition of a target behavior over time. During variable ratio scheduling, consequences are delivered unpredictably but at an average of every *n*th time. While higher response rates have been achieved in humans using variable ratio scheduling, the number of studies is small (Miltenberger & Fugua, 1983; Van Houten & Nau, 1980) suggesting further research in this area is necessary. Even though there has yet to be a systematic approach to evaluating incentive schedules, amounts and duration, a number of recent studies have evaluated the use of incentives for weight loss. Participants in the Finkelstein, et al (2007) trial lost twice as much weight when given a financial incentive for each percent of weight lost compared to control subjects. Offering group based financial incentives was more effective than individual or control conditions (Kullgren, et al., 2013) and participants lost over 3 times as much weight in lottery and deposit contract versus control conditions in the Volpp, et al. (2008) trial. Despite these promising results, there is no information on how incentives may differentially shape the behavior of diverse population groups. It is reasonable to assume that the perception and value of an incentive may vary with one's level of income. A recent review by Burns and Colleagues (2012) suggested that while the current studies are quite heterogeneous, there is significant promise of material incentives to increase behaviors to which they are most closely linked (eg., weight change or program attendance). Therefore, their value in facilitating the adoption and maintenance of behavior change in high risk groups is evident.

Conclusion

High risk disadvantaged population groups are at increased risk for obesity and the concomitant associated morbidity and mortality. The literature on how best to treat obesity in high risk groups is sparse with current outcomes well below what is expected for behavioral interventions. There is much speculation on the barriers to weight loss but little systematic evaluation of whether minimizing specific barriers actually enhances outcomes. Despite the current limitations, existing results demonstrate that some individuals from low income groups derive a benefit when offered a structured intervention for weight loss. However, weight loss and maintenance of weight loss can require substantial resources which may be lacking among low-income individuals. Therefore, more research is needed to systematically reduce barriers to treatment with an eye toward understanding what adaptations are predictive of success. The use of telecommunications technology to enhance reach, access, tailoring and evaluation of intervention utilization while material incentives may improve adoption and maintenance of new lifestyle behaviors. These are just two ideas for future research directions that might prove fruitful. Despite widespread attention from

the public health community and increasingly from policymakers, there has been uneven progress in improving health disparities. Indeed, during the past several decades, already pressing racial/ethnic and socioeconomic gaps have increased for a number of conditions including obesity (Bleich, et al., 2012). Few would argue that more work is necessary to best address the needs of socioeconomically disadvantaged individuals who bear the greatest risk and disease burden of obesity. We need to do more and we need to do better.

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Highlights

- High risk disadvantaged population groups are at increased risk for obesity
- Current obesity treatment outcomes are below what is expected for behavioral interventions.
- The use of telecommunications technology and material incentives may improve weight loss outcomes.