Application of Social Cognitive Theory in Obesity Prevention: A Rapid Review

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ABSTRACT

Obesity, as a result of including the chronic positive energy balance, is associated with many chronic diseases. Prevalence of obesity is increasing worldwide, including in selected developing countries, from previous very low status. Association or causality of one or more constructs of social cognitive theory to prevent and control obesity is paramount for program interventions.

We searched titles and abstracts using End Note Software and then approached original articles in databases of PubMed, Google Scholar and Health Inter-Network Access to Research Initiative (HINARI) in English language published between Jan 1, 2000 and Jan 10, 2015. The articles included only when one or more of the constructs of social cognitive theory viz. reciprocal determinism, behavioral capability, observational learning, reinforcements, expectations and self-efficacy were examined quantitatively with obesity or overweight. The data from the articles were then summarized and interpreted.

Out of 90 accessed and reviewed full-text articles, 22 included in the review, mostly of which studies were conducted in developing countries. The review results showed that intervening the constructs of social cognitive theory was found effective in preventing obesities including childhood obesities. In studies where media campaign was added with social cognitive theory, logistic regression results demonstrated that behavior change was greater among women.

Self-efficacy and social support are the important constructs of social cognitive/learning theory to be effective and associated in obesity prevention, others remaining modest. It is suggested that the constructs are integrated with media campaign and ecological components when intervened.

Key words: Social, cognitive, obesity, overweight, behaviour, self-efficacy, physical.

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INTRODUCTION

Obesity is a burgeoning medical condition in which excess body fat has accumulated to the extent that it may have a negative effect on health, leading to reduced life expectancy and/or increased health problems.[1] People are considered obese when their body mass index (BMI) a measurement obtained by dividing a person's weight by the square of the person's height, exceeds 30 kg/m^2, with the range 25-30 kg/m^2 defined as overweight.[2] Obesity is now so common within the world's population that it is beginning to replace under nutrition and infectious diseases as the most significant contributor to ill health.

In particular, obesity is associated with diabetes mellitus, coronary heart disease, certain forms of cancer, and sleep-breathing disorders. Obesity as a measurement only accounts weight and height and neither it takes into account the morbidity and mortality associated with more modest degrees of overweight nor the detrimental effect of intra-abdominal fat. The global epidemic of obesity results from a combination of genetic susceptibility, increased availability of high-energy foods and decreased requirement for physical activity in modern society. Obesity should no longer be regarded simply as a cosmetic problem affecting

certain individuals, but an epidemic that threatens global well-being.[2] Social Cognitive Theory (SCT) states that learning occurs in a social context with dynamic and reciprocal interaction of the person, environment and behavior. Because of the unique feature of SCT that emphasis on social influence and its emphasis on external and internal social reinforcement – it considers unique way by which an individual acquires and maintains behavior whilst considering the social environment.

METHODS

Search Strategy and Selection Criteria

We searched PubMed, Google Scholar and HINARI for published articles from 2000 Jan 1 to 2015 Jan 10. The articles were searched, retrieved and managed by using EndNote (version X3) software. List of key words entered and outputs are shown in table1.

Table.1: Search strategy and selection criteria

S.N	Search Item (Items found)
1.	social marketing, obesity OR overweight prevention {233}
2.	obesity OR overweight prevention, stages of changes, transtheoritical model {9}
3.	Theory of reasoned action, obesity OR overweight prevention, developing countries {5}
4.	obesity/overweight treatment, social cognitive theory {79}
5.	female obesity/overweight prevention, behavioral learning theory {12}

Screening and Data Extraction

Only published articles in English language and based on obesity in developing countries as well as some developed countries were reviewed. The data extraction was done manually (fig. 1).

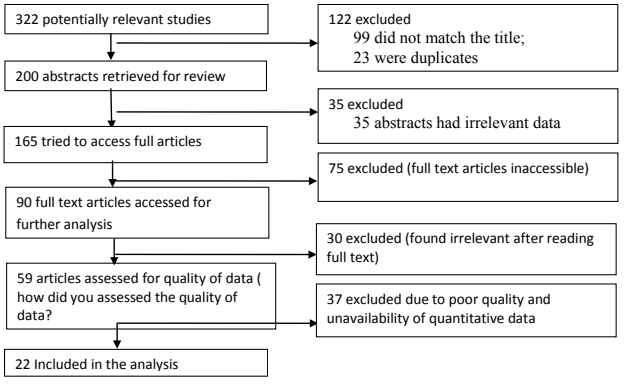

Fig. 1: Screening and data extraction

RESULTS

Nineteen interventional and three observational studies were reviewed. The sample size ranged from 22 to 15000. Interventional studies ranged from single group to randomized controlled trials, whereas observational studies included longitudinal and cross-sectional studies. Social cognitive/learning theory goes beyond behaviorism and thus corresponds to opening the black-box of human beings. It thus includes social learning and imitation, self-identity, thinking and rationalization. These constructs have been found mostly effective and associated in most of the studies (table 2).

Table 2: Study design, results and conclusions of 22 studies

Study	Model/ theory and constructs	Research/ Study design	Sample Size	Results (including statistic and p-value)	Conclusion	Remarks
Gray-Donald et al.[3]	Social Learning Theory	Prospective interventional study	219	This intervention had only a minor impact on dietary behavior of the sample.	Finding ways of encouraging appropriate body weight and activity levels remains a challenge.	SCT was not found to be Effective.
Dewar et al.[4]	Social Cognitive Theory model on, Adolescent Girls.	Interventional	235 Subjects	Current findings indicate a large proportion of the variance for physical activity and intention (28% and 34%) remains unexplained.	The proposed pathways in the SCT model were not fully supported	SCT was not found effective, may be of low sample size.

Dressler et al.[5]	Social Cognitive theory on Urban Middle Aged women	Interventional	330 women's	Suggest that personal, behavioral, and self-identity factors can help to explain some weight variation observed among women living in similar obesogenic, low-income environments.	Results showed that only self-efficacy was associated with physical activity.	Integration of other models, that include ecological components, should be fostered.
Patrick et al.[6]	Social Cognitive Theory on Young Adults	Randomized Control Trial	404 subjects	Theory-driven, evidence-based strategies for physical activity, sedentary behavior, and dietary intake can be embedded in an intervention.	Using social and mobile technologies to promote healthy weight-related behaviors in young adults is effective.	Mobiles and internet also serve as a effective interventional components in obesity prevention.
Sharpe et al.[7]	Social Cognitive Theory Targeted on middle-aged women	Community-based intervention	2768 subjects	Women in the behavioral intervention had statistically significant (n= 234, pre 822, post) (P-value < 0.001)positive changes. Media exposed women had statistically significant (P-value < 0.001) pre- to post program differences on knowledge of mapped routes.	No-intervention women had significant pre- to post program differences on physical activity minutes, walking, and knowledge of mapped routes.	Women must be exposed to medias for effective intervention implementation regarding obesity prevention and control.
Briley et al.[8]	Social Cognitive Theory	Multicenter Randomized Control Trial	1546 subjects	Findings of this trial suggest that the lifestyle mediated improvement of glycemic control in obese pregnant women can minimize the risk of pregnancy complications.	Obesity is related with pregnancy complications as well.	SCT can be used as a method of preventing pregnancy complications too.
Castro et al.[9]	Motivational interviewing grounded in social cognitive theory	Interventional	400 obese/ overweight Latino smokers	Identified common mechanisms underlying change in smoking, physical activity, and diet used as treatment targets; identified practical models of patient-centered cross-cultural service provision	A practical example of how an intervention can be adapted to maximize relevance and acceptability and also maintain the core elements of the original evidence-based intervention	The intervention package was adopted from smoking cessation program.

Dewar et al.[10]	Intervention, guided by Social Cognitive Theory.	Group randomized controlled trial with 12-month follow-up	357 adolescent girls	Significant between group differences in favor of the intervention group for self-reported recreational computer use (-26.0 min; 95% CI, -46.9 to -5.1), and sedentary activities summed (-56.4 min; 95% CI, -110.1 to -2.7), however objective sedentary behavior showed no differences	Intervention for adolescent girls in low-income communities significantly reduced time spent in sedentary activities. However, improvements in physical activity and hypothesized mediators of physical activity behavior were not observed	Intervention included enhanced school sport, lunchtime physical activity sessions, interactive seminars, nutrition workshops, to encourage physical activity and healthy eating, and a decrease in sedentary behavior.
Dewar et al.[11]	Multi component intervention guided by social cognitive theory	RCT, the Nutrition and Enjoyable Activity for Teen Girls (NEAT Girls) intervention.	357 adolescent girls	No intervention effects on BMI (adjusted mean difference -0.33, 95% CI= -0.97, 0.28, p=0.353) and BMI z-score (-0.12, 95% CI= -0.27, 0.04, p=0.178). However, there was a group-by-time interaction for percentage body fat (-1.96%, 95% CI= -3.02, -0.89, p=0.006). Intervention effects for physical activity, screen time, and dietary intake were not significant	The NEAT Girls intervention did not result in effects on BMI	Study of youth who are "at risk" of obesity should focus on strategies to improve retention and adherence in prevention programs.
Puma et al.[12]	social cognitive theory	Quasi-experimental design comparing intervention and comparison cohorts	15,000	Long-term effects were observed in nutrition-related knowledge and attitudes but not self-efficacy or behavior change	It Had limited lasting effects when students have increased autonomy to make food choices.	Intervention can only be useful when subjects are given to autonomy to food choices.
Rosario et al.[13]	Health Promotion Model and social cognitive theory.	Randomized trial	464 subjects	Children from intervention group reported a reduction whereas the control group reported an increase in solid LNED foods consumption. The odds of increasing solid LNED foods consumption was 0.48, 95%CI (0.24, 0.95) in the intervention schools.	Study provides further support for the success of intervention programs aimed at limiting the consumption of solid LNED foods in children.	Intervention program were held by teachers previously trained in nutrition, on the consumption of low nutrient, energy-dense (LNED) foods, of children attending elementary schools

Safdie et al.[14]	Integration of ecological principles and Social Cognitive Theory (SCT) constructs	School-based obesity prevention program implemented in Mexico	15 schools	The most frequently used SCT construct within both intervention domains was Reciprocal Determinism (e.g., where changes to the environment influence changes in behavior and these behavioral changes influence further changes to the environment); no significant differences were observed in the use of SCT constructs across domains.	Promising combination of strategies and theoretical constructs that can be used to implement a school-based obesity prevention program	Strategies emphasized school-level infrastructure/ personnel change and strong political engagement and were most commonly underpinned by Reciprocal Determinism for both Nutrition and Physical Activity.
Smith et al.[15]	Self-determination theory and social cognitive theory.	'Active Teen Leaders Avoiding Screen-time' (ATLAS) obesity prevention intervention in low-income communities	22	Primary outcomes were (BMI) and waist circumference. Secondary outcomes include BMI z-scores, body fat muscular fitness (grip strength and push-ups), screen-time, sugar-sweetened beverage consumption, resistance training skill competency, daytime sleepiness, subjective well-being, physical self-perception, pathological video gaming, and aggression.	ATLAS is an innovative school-based intervention designed to improve the health behaviors and related outcomes of adolescent males in low-income communities.	ATLAS can be used as an effective intervention for obesity prevention in developing countries as well.
Smith et al.[16]	Guided by self-determination theory and social cognitive theory.	Cluster randomized controlled trial conducted in 14 secondary schools in low-income communities	361	No significant intervention effects for BMI, waist circumference, percent body fat, or physical activity. Significant intervention effects found for screen-time (mean +/- SE: -30 +/- 10.08 min/d; P = .03), sugar-sweetened beverage consumption (mean: -0.6 ± 0.26 glass/d; P = .01), muscular fitness (mean: 0.9 ± 0.49 repetition; P = .04), and resistance training skills (mean: 5.7 +/- 0.67 units; P < .001).	School-based intervention targeting low-income adolescent boys did not result in significant effects on body composition, perhaps due to an insufficient activity dose.	Intervention was successful in improving muscular fitness, movement skills, and key weight-related behaviors.

Leach et al.[17]	Baseline nutrition intervention, grounded in Social Cognitive Theory	Intervention on blinded cohorts used on study participant in Mississippi public school students	22 volunteers of 57 eligible, overweight female	No pre intervention differences were found in height, weight, BMI, or age. Higher follow-up BMI scores were found in both groups, and. Gains in nutrition knowledge were sustained (P < .002); however, there was no association between nutrition knowledge and follow-up BMI (r = -.185; P < .462).	Minimal nutrition education alone may be an ineffective intervention for overweight children. Provides an example of how youth soccer may benefit overweight children	No significant differences between groups were found, possibly because of the small sample sizes and the short 8-week soccer intervention period
Lubans et al.[18]	Social Cognitive Theory (SCT) assessed using a questionnaire.	Group randomized controlled trial on One hundred adolescent boys (mean age=14.3 (0.6) years)	100	Intervention had significant effect on resistance training self-efficacy (p<0.001), but none of the SCT constructs satisfied the criteria for mediation. Changes in BMI were also associated with changes in resistance training self-efficacy (r=-0.21, p=0.06) and physical activity behavioral strategies (r=-0.29, p=0.009).	Intervention incorporating student leadership increased adolescent boys' resistance training self-efficacy, but changes in physical activity were not detected and none of the SCT constructs satisfied the criteria for mediation.	Baseline weight status was a moderator of intervention effect with the strongest intervention effects observed among overweight and obese adolescent boys.
Mastin et al.[19]	Social cognitive theory framework	Observational	46 women	Although participants' primary weight-related obstacles were environment-based, for example, unsafe environments in which to engage in regular exercise, they more often offered individual-based solutions.	Discussion of media advocacy as a tool that can be used to promote environmental solutions.	Media advocacy can be used to increase effectiveness of interventions.
Mead et al.[20]	Social cognitive theory and Social ecological models	Community-based, multi-level intervention using formative research and a community participatory process.	246 adults	Respondents living in intervention communities showed significant improvements in food-related self-efficacy (beta = 0.15, p = .003) and intentions (beta = 0.16, p = .001) compared with comparison communities.	.More improvements from the intervention were seen in overweight, obese, and high socioeconomic status respondents.	Community-based, multilevel intervention is an effective strategy to improve psychosocial factors for healthy nutritional behavior change to reduce chronic disease in indigenous populations

Winett et al.[21]	Social cognitive theory (SCT)	Internet-based intervention	-	The high use of the Internet provides a vehicle to reach different population segments with readily accessible, SCT-tailored long-term programs. Research studies using the Internet with tailored SCT interventions have shown changes in nutrition practices, physical activity, and weight loss for up to a year	One promising approach to weight gain prevention in population segments is the development and wide spread use of longer-term Internet programs using specific principles and procedures from SCT.	More dynamic use of social cognitive theory (SCT) for developing programs to maintain health behavior changes is emerging with some evidence of long-term maintenance
Li et al.[22]	Social cognitive theory	Cross-sectional survey	2400 children	15.2% of children were overweight and 10.9% were obese; nearly 80% of children spent inverted question mark2 hrs./day either on physical activities or screen time.	Screen time is independently associated with childhood obesity, and needs be focused for obesity prevention in school-aged children in China.	Compared with those spent >3 hrs./day on screen time, children who spent inverted question mark2 hrs./day or between 2-3 hrs./day were significantly less likely to be obese after adjusting for other variables
Neumark-Sztainer et al.[23]	Social cognitive theory	Cohort study performed	201 girls	The two strongest and most consistent factors associated with change in physical activity were time constraints and support for physical activity from peers, parents, and teachers	Effectiveness of interventions aimed at increasing physical activity among adolescent girls might be enhanced by engaging support from friends, family, and caring adults which may help in obesity prevention	Physical activity is an important component of a healthy lifestyle, with implications for the prevention of chronic diseases and obesity.
Arikan et al.[24]	Social cognitive Theory	Randomized control trial	2,038 subjects	Of the total participants, 85.2% learned about the "Fighting-Obesity Campaign" through television, 28.1% through radio, 11.0% from newspapers, 6.0% from billboards, and 19.2% from other sources. Study revealed that 28.5% of the participants adopted desired behavioral changes after exposure to campaign. Logistic regression demonstrated that behavior change is greater on women.	Media campaigns may cause behavioral changes by increasing motivation to prevent obesity within the target population.	Continuing these types of campaigns can lead to success at the national level too.

DISCUSSION

Types of obesity prevention interventions targeting social relational constructs and characterized by the degree to which these interventions have addressed key social relational constructs in intervention design and implementation play importantly in overweight and obesity. Social cognitive theory does not propose that increasing self-efficacy will inevitably result in behavior change [25]. The theory states that the effects of self-efficacy on behavior will be moderated by outcome expectancies, i.e. beliefs that a particular behavior will lead to a particular outcome. Where an individual believes that the behavior will not lead to a valued outcome, self-efficacy will not motivate behavior change. For example, an individual may believe they can drink fewer alcoholic drinks, but if they do not think the amount they are drinking is harmful, such self-efficacy will not result in less consumption. In terms of the present review, obese individuals do not believe that increasing their physical activity will lead to weight loss, which presumably would be a highly valued goal. There is evidence that the relationship between increased physical activity and weight loss is far from straightforward[26], so that this would be reasonable outcome expectancy for many obese people. Thus, this population may be convinced by an intervention that they can increase their physical activity, but if they were not convinced that this would result in the salient outcome of weight loss, it would not necessarily result in increased physical activity. Apart from this only the construct "self – efficacy" of social cognitive theory has been widely used in many of its interventions.[27] In this study media campaign was launched grounded in social cognitive theory logistic regression results demonstrated that behavior change is greater among women.[24] There were a range of outcomes found in the set of interventions. Obesity-related outcomes included (1) anthropometric indicators, such as body mass index or body fat percentage, (2) physiological measures of cholesterol, blood pressure, and blood sugar, and (3) behavioral risk factors such as physical activity, dietary patterns and knowledge, screen time, sedentary time, and smoking. A number of studies included psychological and psychosocial outcomes, such as depressive symptoms, self-efficacy, and motivation, while some studies also included social indicators, such as social support. Furthermore, the frequent reference to self-efficacy in the selected interventions requires additional attention. Self-efficacy; which comprises an individual's motivation, locus of control, behavioral choices, intentions, and actions with respect to their goals, tasks, and challenges; was often included as a predictor, mediator, or moderator of overweight and obesity risk factors and status. The theoretical emphasis on personal responsibility and control belies the use of concepts related to social, political, and organizational change.[28]This is not to detract from the value of individually oriented theories.[29] However, mounting evidence suggests that innovative strategies for addressing and preventing obesity at a population level should entail theories and approaches that operate from an ecological perspective.[30] Integrative research review applying Stetler's model of research utilization also revealed that constructs of social cognitive/learning theory are effective in eight out of ten studies to prevent and treat childhood obesity among four to 14 years children.[31]

CONCLUSION

Self-efficacy and social support are the important constructs of social cognitive theory in obesity or overweight prevention or maintaining normal body weight. Other constructs remained to be modest even among the children. Media effects and ecological components add the effectiveness.

RECOMMENDATIONS

It is recommended that ecological components like media campaign or internet should be integrated with any of the constructs such as self-efficacy and social supports, when applying social cognitive theory to prevent obesity or overweight. Internet is becoming even a more useful tool in such.

AUTHORS' CONTRIBUTIONS

CA developed the review guideline and oversaw all aspects of this study. AP, DT, RT, SM and SG retrieved the articles; extracted data; summarized findings; and prepared the draft manuscript. AP reviewed and provided the valuable feedback. All authors provided valuable contributions to the

development and refinement of the manuscript including intellectual content. CA reviewed and incorporated the feedback and prepared the final manuscript. All authors read and provided approval of the completed manuscript.

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CONFLICTS OF INTEREST

The authors declare that they have no competing interests.

ETHICAL APPROVAL AND CONSENT TO PARTICIPATE

Not applicable.

AVAILABILITY OF DATA AND MATERIALS

Not applicable.

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