

# Social Ecological Model and Underage Drinking: A Theoretical Review and Evaluation

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**How to cite this paper:** Alghzawi, H. M., & Ghanem, F. K. (2021). Social Ecological Model and Underage Drinking: A Theoretical Review and Evaluation. *Psychology*, 12, 817-828.

<https://doi.org/10.4236/psych.2021.125050>

**Received:** March 26, 2021

**Accepted:** May 28, 2021

**Published:** May 31, 2021

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## Abstract

Social Ecological Model (SEM) is a theoretical framework using a comprehensive approach to assess or change human behavior. This article aims at evaluating the SEM according to Fawcett criteria, and then discusses its appropriateness to be used as a theoretical framework for a study on underage drinking. A comprehensive search was conducted using PubMed, Google Scholar, EBSCO, CINAHL, and Ovid Journal databases. It was found that SEM has a social and theoretical significance in nursing field. It consistently states its concepts and assumptions without redundancy. SEM has been tested by several studies, and the findings of these studies were congruent with SEM's assumptions. SEM helps in a better understanding of underage drinking, and then tailoring comprehensive prevention programs to tackle this problem.

## Keywords

Underage Drinking, Social Ecological Model, Concept, Assumption, Values, Parsimony, Testability, Empirical Adequacy, Pragmatic Adequacy, Fawcett

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## 1. Introduction

Underage drinking is a serious public health concern. Every day in the United States, more than 4750 children under age 16 have their first full drink of alcohol (SAMHSA, 2019). In 2019, almost 24.6 percent of children ages 14 to 15 year-old reported having at least 1 drink. Moreover, almost 2 out of 100 children ages 12 to 13 reported drinking alcohol in the past month and fewer than 1 in 100 engaged in binge drinking (SAMHSA, 2019). It is widely acknowledged that underage drinking is associated with negative medical and social consequences among underage drinkers (Carpenter & Merrill, 2021; Morean, Peterson, & L'Insalata,

2019; Smit et al., 2018). To develop and implement effective prevention and intervention programs for underage drinking, it is necessary to understand the predictors of underage drinking (Morean et al., 2019).

Several studies have examined predictors of underage drinking (Alghzawi et al., 2014a; Morean et al., 2019; Trucco, 2020). Predictors of underage drinking could be divided into individual factors (e.g., alcohol-related cognitions, personality, and behavioral) and environmental factors (e.g., family, peers, and media) (Smit et al., 2018). Since underage drinking is a multifaceted behavior which influences are drawn from various sources, the social ecological model (SEM) is highly recommended theoretical model to better understanding this behavior (Alghzawi, 2012; Alghzawi et al., 2014a, 2014b, 2014c; Scheier, 2001).

Literature search revealed limited use of other models and theories, such as the stages of change model (Prochaska & DiClement, 1982) and self-efficacy theory (Bandura, 1977, 1997) to explain the behavior of alcohol use. While these theoretical frameworks are still useful, they merely focus on the individual and the psychology of the change process and do not take into consideration the multiple factors that influence children's behaviors, such as the social environment, interpersonal factors, and public policy. This confirms that SEM is the most appropriate model for a topic such as underage drinking. This article aims to evaluate the SEM according to Fawcett criteria, and then discuss its appropriateness to be used as a theoretical framework for a study on underage drinking.

## 2. Methods

A comprehensive search was conducted using PubMed, Google Scholar, EBSCO, CINAHL, and Ovid Journal databases. The online search process was carried out using general terms, such as "underage drinking," "social ecological model," "concept," "assumption," "values," "parsimony," "testability", "empirical adequacy," "pragmatic adequacy," and "Fawcett".

## 3. Results

### 3.1. An Overview of Social Ecological Model

SEM is a comprehensive approach to explain individual's behaviors. The term ecology originates in the biological sciences and refers to the interrelationships between organisms and their environments. SEM has evolved over a number of decades in the fields of sociology, psychology, education, and health. It focuses on the nature of people's interactions with their environments (Bronfenbrenner, 1994). This model suggests that behavior is affected by multiple levels of influence (McLeroy et al., 1988).

SEM developed out of the work of three prominent researchers. Initially, Urie Bronfenbrenner (1994) developed the ecological systems theory, which focused on the relationship between the individual and the environment. Then, Kenneth McLeroy et al. (1988) developed the ecological model of health behaviours which

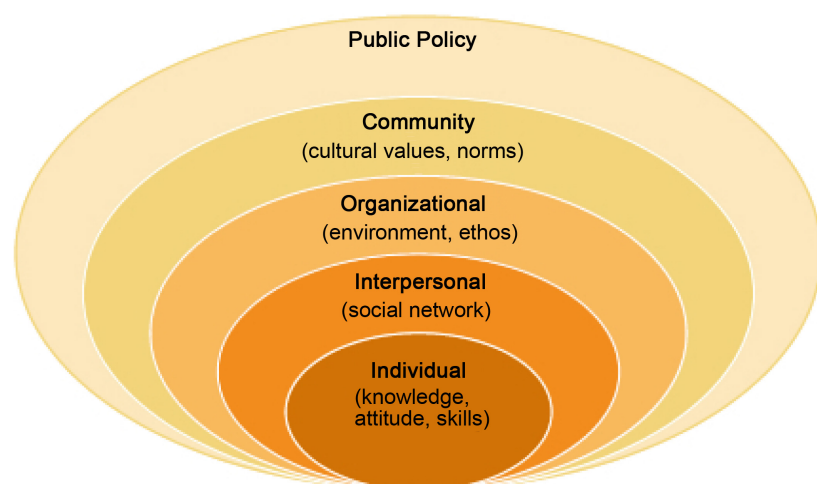
classified five different levels of influence on health behaviour. Lastly, Daniel Stokols (1992), who developed the social ecology model of health promotion, identified the core assumptions that underpin the social-ecological model (Glanz et al., 2008).

SEM provides a set of conceptual and methodological principles, drawn mainly from systems theory, for organizing comprehensive, community-based promotion initiatives (Glanz, Lewis, & Rimer, 1997). SEM is multifaceted, targeting individual, environmental, behavioral, and social policy changes that help individuals make health choices in their daily lives. SEM is unique in that it takes into account the physical environment and its relationship to people at intrapersonal, interpersonal, organizational, community, and public policy levels. This perspective is based on the major philosophical construct of the SEM that behavior does not occur in nothings (Glanz, Lewis, & Rimer, 1997). Literature search demonstrated that SEM provides promising results in preventing many public health problems, such as alcohol and tobacco use; however, additional research should be directed to applying this model to other public health problems (Alghzawi, 2018; Breslow, 1996; Jamner & Stokols, 2000; Richard et al. 1996).

A major principle in SEM is reciprocal determinism or the interaction between the individual's behavior and the surrounding environment. Reciprocal determinism is a concept originally identified by Bandura (1977) in social cognitive theory. It means that the environment largely controls behavior and over time changing environmental variables lead to modification of behavior (Green, Richard, & Potvin, 1996).

### 3.2. Major Concepts

As shown in **Figure 1**, the core concept of SEM is that behavior has multiple levels of influences, often including intrapersonal level (biological, psychological),



**Figure 1.** The social ecological model: A framework for prevention. Source: Adapted from the centers for Disease Control and Prevention (CDC).

<http://www.cdc.gov/violenceprevention/overview/social-ecologicalmodel.html> (retrieved April 21, 2021).

interpersonal level (social, cultural), organizational level, community level, and policy level. **Table 1** provides a brief description of SEM's levels. These levels are summarized as follows:

1) The intrapersonal level (Individual level) of the social ecological model takes into accounts an individual's knowledge, attitudes, values, skills, self-concept, and self-confidence. Strategies that bring change at the individual level tend to focus on changing an individual's knowledge, attitudes, behaviour, and skills. They include education and mentoring programs, mass media campaigns, social marketing, and skills development (McLeroy et al., 1988).

2) The interpersonal level includes an individual's social networks, social supports, families, work groups, peers, and neighbors. Intervention strategies at this level include enhancement of social supports and social networks, changing group norms, and increasing access (McLeroy et al., 1988).

3) The organizational level includes organisational characteristics of social institutions, organizational culture and structure, management styles, and educational institutions. Intervention strategies at this level include incentive programs, process consultation, coalition development, and agency linkage (McLeroy et al., 1988).

4) The community level includes community resources, neighborhood, social and health services, folk practices, community leaders, businesses, and transportation. Intervention strategies at this level include community development, community coalitions, empowerment, conflict resolution, and mass media campaigns (McLeroy et al., 1988).

5) The public policy level includes legislation, policies, taxes, and regulatory agencies. Strategies to intervene at this level include mass media campaigns, policy analysis, political change, and lobbying (McLeroy et al., 1988).

**Table 1.** Summarized levels of influences according to SEM.

Level of influence	Description
Intrapersonal Individual, personal	Individual characteristics that influence behavior: Knowledge, self-confidence, skill, etc.
Interpersonal Family, friends, peers	Interpersonal processes and groups providing identity and support
Organizational Churches, Mosque, schools	Rules, regulation, policies, structures constraining or promote behaviors
Community Social networks	Community norms (community regulations)
Public policy Local, state, federal	Policies and laws that regulate or support healthy practices/actions

### 3.3. Belief, Assumptions, and Values

#### 3.3.1. Assumption

Many factors within five levels influence individual's behaviours. Therefore, efforts to assess or change behaviour should be based on the understanding of the interrelationship between the five levels of the SEM; intrapersonal level, interpersonal level, organizational level, community level and policy level. Assessment of individual's behaviour and interventional programs are more likely to be effective when they target multiple components of the SEM (Stokols, 1992).

Environments are multidimensional and complex. Social or physical environments can be described as containing a variety of features or attributes, such as the size, temperature, facilities and safety. Environments can also be described in terms of their actual or perceived qualities. The variable nature of environments has a direct implication on the design of initiatives to promote human behaviour (Stokols, 1992).

Human-environment interactions can be described at varying levels of organisation. Human interactions with the environment can occur at individual, small group, organisational, community or population levels. The SEM does not just focus on the individual but includes multiple levels of human interaction with environments. For example, interventions promoting human behaviour can be large such as whole population mass media campaigns or may focus on organisations such as school settings or may be based around a local community which they are tailored to. The effectiveness of campaigns to promote human behaviour is enhanced when they target differing levels of the human-environment interaction (Stokols, 1992).

The interrelationships between people and their environment are dynamic. There is a reciprocal relationship between people and their environments. The social, physical and policy environments influence the behaviour of the individual, while at the same time behaviour of the individual, group or organisation also impact on the wellbeing of their environments. The environment can control or set limits to human behaviour that occurs within it. Making a change in the environment can result in a modification of behaviour (Jamner & Stokols, 2000; Stokols, 1992).

#### 3.3.2. Beliefs

- Comprehensive assessment of specific individual's behavior should cover the all multi levels of influences, including the intrapersonal, interpersonal, organizational, community, and public policy levels.
- Influences on behaviors interact across these different levels.
- The ultimate purpose of the SEM is to inform the development of comprehensive intervention approaches that can systematically target mechanisms of change at several levels of influence.
- Behavior change is expected to be maximized when environments and policies support healthful choices, when social norms and social support for healthful choices are strong, and when individuals are motivated and educated to

make those choices.

### 3.3.3. Values

- It is important to assess multifaceted behaviors such as underage drinking based on a comprehensive model such as SEM.
- It important to establish prevention and promotion programs that target all levels of influences on children's behavior.
- Health care providers should commit to SEM's assumptions when they deal with patient has multifaceted behavior such as alcohol use.
- Nurses should equally cover all levels of influences when they assess patient's behavior and not just focusing on specific level and ignoring others.

## 3.4. Evaluation of SEM Using Fawcett Criteria

### 3.4.1. Significance

The significance criterion requires the model to reflect social significance and theoretical significance (Fawcett, 2005). Social significance is evident when a theory or a model addresses a problem of particular interest to society (Fawcett, 2005). SEM is a socially significant model because it had a broad use in nursing field, specifically, in predicting the individual's behaviour and in health promotion. It addressed problems of particular interest to society such as the alcohol use problem, the obesity problem, and the risk factors associated with HIV (Katherine, Quinn, & Thompson, 2004; Yu & Stiffman, 2007; Erika, 2008; Brown, 2011; Gruenewald, Remer, & LaScala, 2013). On the other side, theoretical significance is evident when the model addresses a phenomenon of interest to the nursing discipline either by extending the knowledge or filling gaps in an existing theory about the phenomenon (Fawcett, 2005). The SEM met the criterion of theoretical significance as evidenced by addressing assumptions extended and filled gaps in the previous theories such as self-efficacy theory (Bandura, 1977, 1997).

### 3.4.2. Internal Consistency

The internal consistency of the model can be evaluated through three major requirements: semantic clarity, semantic consistency, and structural consistency (Fawcett, 2005). Semantic clarity is met; as evident by providing the core concept of a social ecological model which is multiple levels of influences, often including intrapersonal (biological, psychological), interpersonal (social, cultural), organizational, community, physical environmental, and policy. These levels have a reciprocal relationship between them. Semantic consistency is also met; as evident by consistent use of the same concepts and the same definitions in the model's discussions. Structural consistency is also met; the linkages between concepts are specified and no contradictions in the relationships are evident. These linkages clearly implicate that the levels of influence are interrelated and the reciprocal relationship exists between them.

### 3.4.3. Parsimony

The model is parsimonious when its content is stated clearly without redundan-

cy (Fawcett, 2005). The model is parsimonious because it states the assumptions with the minimal number of concepts and without oversimplifying or redundancy. The model categorises all factors that could affect on human behaviour into just five levels and it is easy for the readers to classify any factor into one of these levels. For example, it is easy to recognize that self-confidence is one of the intrapersonal factors that affects and affected by the other levels of influences.

#### **3.4.4. Testability**

The model is testable when its concepts can be can be observed empirically, proposition can be measured, and its derived hypothesis can be falsified (Fawcett, 2005). Several researches have tested SEM. For example, Gruenewald et al. (2013) conducted a study on alcohol users from 50 cities in California, and this study aimed to test the SEM. They found that community availability of alcohol and individual drinker characteristics appear to act jointly to affect drinking levels and use of drinking contexts. This study is a good example on the studies that test SEM, and the congruency between its findings and SEM's assumption confirms the fitness of this model.

#### **3.4.5. Empirical Adequacy**

This criterion requires the assumptions made by the model to be congruent with empirical evidence (Fawcett, 2005). Empirical adequacy is met by SEM because its assumptions are congruent with the findings of all studies used this model as a theoretical framework. For example, Yu and Stiffman (2007) conducted a study using SEM to investigate the cultural and environmental predictors for alcohol abuse and dependence in American Indian people. In addition, Erika (2008) conducted a study using the social ecological model to understand the contextual factors associated with HIV risk in commercial sex workers at high risk for contracting HIV. In general, the findings of these studies were congruent with the SEM's assumption that human behaviour is affected by interrelated multilevel influences.

#### **3.4.6. Pragmatic Adequacy**

The criterion of pragmatic adequacy focuses on the utility of the theory for nursing practice (Fawcett, 2005). SEM met the criterion of pragmatic adequacy because it was used in the real word of nursing practice and the model's assumptions were utilized in the practice. This conclusion was supported by several studies used SEM in assessing the risk factors for underage drinking and tailoring interventional prevention programs to limit this problem. Moreover, the model's assumptions were utilized in other fields of nursing such as developing prevention programs for alcohol spectrum disorders (Katherine, Quinn, & Thompson, 2004) and tailoring interventional programs for obesity (Brown, 2011).

## **4. Discussion**

Underage drinking is a multifaceted problem that is caused by many factors, and SEM is the most comprehensive model to guide studies related to this topic. The



literature search revealed several studies that support using SEM to better understand the substance use problem, including alcohol, in which characteristics of the individual, as well as those of the family, peer, community, organization, and policy domains influence the likelihood of such involvement (Hawkins, Catalano, & Miller, 1992; Petraitis, Flay, & Miller, 1995; Scheier, 2001). Sociodemographic and individual characteristics play an important role in shaping individual decisions to engage in alcohol use (Petraitis et al., 1995). Several studies on the risk factors of alcohol use highlight the influence of demographic differences, such as gender and age (Alghzawi, 2016a, 2016b, 2016c; Hawkins et al., 1992; Johnston et al., 2006; Scheier, 2001). Other factors, such as depressive symptoms (Armstrong & Costello, 2002), behavioral problems (Alghzawi, 2018; Alghzawi & Ghanem, 2021a, 2021b; Farrell et al., 2005), and academic ability (Fothergill & Ensminger, 2006) are important intrapersonal influences on alcohol use.

The social influences of family and peers are among the most frequently studied risk or protective factors associated with underage drinking (Petraitis et al., 1995). Perceived parental and peer disapproval are significant influences within the interpersonal level (Nash, McQueen, & Bray, 2005; Windle, 2000). Other interpersonal factors predicting underage drinking use are parental alcoholism (King & Chassin, 2007; Wong et al., 2004), greater parental drinking (Hawkins et al., 1997), maternal drinking and smoking (Hayatbakhsh et al., 2008), lower parental monitoring (Hayatbakhsh et al., 2008; Rose et al., 2001), worse home environment (Rose et al., 2001), family disruption (Hayatbakhsh et al., 2008), having more friends who drink (Hawkins et al., 1997), and greater exposure to alcohol use in the movies (Sargent et al., 2006).

Furthermore, several studies examined the effect of factors within organizational level, such as school and religious places on alcohol use among children. For example, Yan et al. (2008) tested a structural model explaining the effects of school connectedness on alcohol use among a sample of Latino children aged 11 - 13. They found that school connectedness had a direct effect, as well as an indirect effect mediated through self-concept and peer norms related to drinking alcohol. This mediating role of peer's norm between school's effect and drinking alcohol confirms the interrelationship between and organizational level the interpersonal level.

Features of the surrounding community influence children's attitudes and behaviors regarding alcohol use. Several studies emphasized the role of children's perceptions of community disorganization, high rates of substance use, and the ready availability of substances within their community as risk factors for engaging in substance use. Research has shown that such community-level characteristics are associated with underage drinking (Bond et al., 2005; Jessor et al., 2003).

Finally, policy factors play a significant effect on childhood alcohol use. The countries could decrease the prevalence of underage drinking through establishing policies and laws that forbidden alcohol selling for children under 18



years old and also forbidden alcohol use in the public place. Vanessa et al. (2014) reported that when the USA passed more laws aimed at limiting underage drinking between 2005 and 2011, children drinking declined. This finding highlights the significant role of policies and laws to prevent alcohol use problem.

## 5. Conclusion

SEM is theoretical framework using a comprehensive approach to assess or change human behavior. The core concept of SEM is that behavior is multifaceted and has multiple levels of influences, including intrapersonal level, interpersonal level, organizational level, community level, and policy level.

This article evaluated SEM using the Six Fawcett criteria. It was concluded that SEM has a social and theoretical significance in nursing field. It consistently states its concepts and assumptions without redundancy. SEM has been tested by several studies, and the findings of these studies were congruent with SEM's assumptions. SEM has been utilized in several areas in nursing.

This article also discussed prior research used SEM as a theoretical guide to examine the risk factors for underage drinking. The majority of prior research has focused on the effect of individual's characteristics, family, peers, schools, community, and policy on underage drinking. The findings of prior research were congruent with SEM's assumptions. Prior research studies support using SEM to examine other predictors for underage drinking, such as self-confidence, social assertiveness, and self-efficacy. Overall, SEM helps in a better understanding of underage drinking, and then tailoring comprehensive preventing programs to tackle this problem.

## Conflicts of Interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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