

## Development of a Cross-level Theory of Individual Cognition and Social Influence

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### Abstract

Socio-ecological theory posits that individual behavioral cognition and social environment jointly determine human behavior. Theories built upon this foundation are classified into individual behavior theory and group behavior theory. To date, these two theories have been used independently at different levels in academic circles to conduct research and address issues related to individual and group behavior. This study attempts to integrate these two theoretical models across levels, constructing a new theoretical framework—the Cross-Level Theory of Individual Cognition and Social Influence—aimed at explaining the combined effect of individual cognition and social influence on behavior. Empirical results demonstrate that this theory can better explain behavior. Deep theoretical integration and fundamental cognitive enhancement constitute the direction for future efforts.

### Full Text

#### Preamble

#### Research on the Construction of a Cross-level Theory between Individual Cognition and Social Influence

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**Abstract:** Social ecological theory posits that individual behavior cognition and social environment jointly determine human behavior. Theories established on this basis have been categorized as individual behavior theory and group behavior theory. To date, these two theories have been used independently

at different levels by academics to study and address individual and group behavioral issues. This study attempts to combine these two theoretical models through cross-level integration, constructing a new theoretical framework—the Cross-level Theory between Individual Cognition and Social Influence—aimed at explaining the combined effect of individual cognition and social influence on behavior. Empirical results demonstrate that this theory provides better explanatory power for behavior. Deep theoretical integration and fundamental cognitive enhancement represent the direction for future efforts.

**Keywords:** Individual behavior theory; Group behavior theory; Cross-level theory between individual cognition and social influence

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## 1 Research Basis

Social ecological theory posits that individual cognition, norms of others and groups, and social environment jointly determine human behavior. Theoretical models established on this basis have been categorized as individual behavior theory and group behavior theory. These two theories have long been used independently at different levels by academics to address individual and group behavioral issues. Theoretically speaking, combining theories from different levels can enhance model explanatory power compared to single-level theories, facilitating more comprehensive and in-depth explanations of behavior. Consequently, interventions based on combined theories are also more effective. In terms of research methodology, numerous studies have employed cross-level approaches to behavioral issues [1-3]. This paper focuses on theoretical cross-level integration. While existing literature has explored theoretical combinations, such efforts typically occur within the same level, particularly among individual behavior theories [4,5]. Research combining theories across different levels remains scarce.

Social cognition theory explicitly addresses the interaction between individual and environmental factors in shaping behavior. However, its theoretical framework concentrates heavily on complex individual cognitive factors, with environmental conditions appearing merely as peripheral elements [6]. Consequently, this theory is often classified as an individual behavior theory in textbooks. From a public health perspective, the intrinsic role of individual factors in behavior is relatively limited, while social environmental conditions hold greater significance. This approach clearly contradicts public health viewpoints. In fact, this theory cannot be considered a standard cross-level theoretical integration. Some scholars have proposed the Theoretical Domains Framework, which encompasses highly complex individual and environmental elements such as knowledge, social roles and identity, beliefs, capabilities, attention, decision-making processes, environmental context, social resources, social influence, emotions, and behavioral norms [7]. We contend that theory represents a series of concepts exploring behavioral mechanisms rather than a simple description of

logical associations. If a formulation cannot explain mechanisms, it should be considered a model rather than a theory. To date, no truly meaningful cross-level theoretical integration has been observed in academia.

How should cross-level theoretical integration be conducted? Numerous behavioral theories exist at different levels, making theoretical selection the primary consideration. Clearly, mere mechanical combination of theories across levels is not the objective of this study. The ideal approach should involve extracting common and key elements from different-level theories and subsequently combining them. This study proposes to use cognition from individual behavior theory and social influence from group theory as these key elements.

Cognition represents the product of human brain activity, encompassing knowledge, awareness, concepts, perceptions, and more. Currently, the vast majority of individual behavior theories are cognitive theories, with cognition serving as the core content of many individual behavior theories. Research indicates that key cognitive elements include behavioral beliefs and problem perception—the former being conceptual products of thought, the latter representing people’s awareness and understanding of issues (perception) [8]. In Chinese culture, problem perception often proves more important than beliefs [9].

The social environment influencing behavior includes socioeconomic status, culture, customs, social resources, and social influence, among others. Among these, the most causally direct and readily changeable “active” element is social influence. Social influence represents a widespread social-psychological phenomenon referring to the impact of social pressure on human behavior [10]. Behavior never occurs in a vacuum; every individual’s behavior is subject to social pressure. Research demonstrates that social networks can influence many health behaviors [11]. Other studies show that altruism, free-riding, and bandwagoning affect vaccination decisions [12]. D’Onofrio et al. found that religious affiliation is primarily a cultural transmission phenomenon, while religious attitudes and practices are influenced by genetic factors [13]. Due to social pressure, individual behavior shifts toward socially dominant directions. Social influence operates on behavior through various mechanisms, primarily three types: conformity, compliance, and obedience [14]. Conformity involves individual behavior aligning with others to maintain a sense of belonging. Compliance entails individuals acting according to organizational or others’ demands. Obedience represents the execution of external authoritative directives. Social influence often functions through social norms—socially approved behavioral standards including organizational norms and reference norms, all of which affect behavior [8]. People’s living environments, as products of society, in turn influence their behavior.

Based on social ecological theory, the authors previously constructed a cognition-social influence theory [9]. In this theory, cognition includes behavioral beliefs and problem perception, while social influence involves others’ behavioral attitudes and behaviors. The theory also incorporated behavioral methods and skills in the transformation among attitudes, behavioral intentions, and behaviors [8]. One study applied the cognition-social influence theory to analyze

TikTok dependency behavior among college students. TikTok cognition was associated with TikTok dependency behavior (OR: 1.11, 95% CI: 1.02-1.22); behavioral pressure from friends (OR: 3.27, 95% CI: 1.33-8.03) and family (OR: 2.21, 95% CI: 1.05-4.67) was positively correlated with TikTok dependency [15]. This study partially confirmed the theory's validity. However, we have recently identified two limitations in the cognition-social influence theory. First, regarding individual behavioral elements, the cognitive components undoubtedly represent key variables in behavior theory. However, the behavioral methods and skills in the transformation among attitudes, behavioral intentions, and behaviors belong to general behavior theory research content, making their inclusion in the theory somewhat superfluous. Second, the social influence component of this theory derives from general social influence theory, which aims to study the impact of others and groups on individual behavior [10]. Consequently, the cognition-social influence theory only considered others' attitudes and behaviors, which is clearly insufficient. In the real world, social influence encompasses much richer content, such as social organizations, groups, and environments. To address these limitations, the authors combined individual cognition and group health behavior theories through cross-level integration, constructing a new cognition-social influence theory—the Cross-level Theory between Individual Behavior Cognition and Social Influence (abbreviated as Cross-level Theory)—aimed at explaining the comprehensive impact of behavioral cognition and social influence on behavior.

## 2 Theoretical Framework and Validation

The structure of the Cross-level Theory is shown below:

Attitude → Behavioral Intention → Behavior  
Reference Norms (Belief-Attitude-Behavior)  
Social Influence  
Institutional Norms (Policy Incentives and Activities)  
Living Environment (Facilities, Behavioral Convenience, Neighbor Behavior)

[Figure 1: see original paper]

As illustrated, this theory encompasses two fundamental aspects: individual cognition and social influence. Compared with the cognition-social influence theory, it has abandoned the behavioral methods and skills component while expanding the scope of social influence. Behavioral cognition includes behavioral beliefs and problem perception as key elements of individual behavior theory. Knowledge only affects behavior when understood and accepted; therefore, it is not treated as a cognitive element from the starting point of cognition and social influence. General social influence theory aims to study the impact of others and groups on individual behavior [10]. The Cross-level Theory encompasses broader social influence elements, including reference persons, social organizations, groups, and environments. Reference persons' behaviors create behavioral pressure on actors, leading to behavioral changes. The authors observed car pur-

chasing behavior during the early stages of automobile popularity in China. For instance, in an office with seven or eight colleagues, when one person purchased a car, others became interested; when two had cars, the rest felt uneasy; when three owned cars, everyone felt compelled to act. Thus, individual behavior becomes entrapped by others' behaviors. The theory's inclusion of behavioral cognition and reference norms has been validated in previous research [15].

Another major aspect of social influence is institutional norms. According to China's current social structure, work units are most closely related to individuals and exert considerable influence on their behavior. For example, in physical exercise, unit incentive policies and organized exercise activities affect individual behavior. Similarly, for weight loss, in addition to the above, offering smaller portions in workplace cafeterias represents an intentional intervention. Our research has confirmed the importance of institutional norms and behaviors. Since 2007, we have implemented the "tobacco control advocacy capacity" program in medical schools and universities with medical or health programs nationwide. To date, 102 universities across all provinces, municipalities, and autonomous regions have participated. This group research project aims to enhance tobacco control advocacy capacity among medical and health professional faculty and students. Based on theoretical learning, practice takes the form of smoke-free campus construction, involving: school smoke-free campus policies, campus no-smoking signage, and smoke-free campus advocacy activities. Evaluation research found that the program significantly improved faculty and students' interest, attitudes, motivation, and behaviors regarding tobacco control [16,17]. Some scholars have studied community organizational norms and behaviors as influences on behavior, though this warrants discussion. Current community organizational forms have loose relationships with residents, limiting their behavioral influence. Another aspect of social influence is living environment. Numerous studies demonstrate close relationships between living environment and individual behavior. Research found that residential environmental pollution levels were significantly positively correlated with attitudes toward tobacco control policy support [18]. Another study found that more severe residential environmental pollution and traffic congestion were associated with higher internet addiction rates [19]. Similarly, for exercise behavior, neighborhood accessibility, green spaces, sports facilities, and exercise behaviors of community residents all affect individual exercise behavior.

### 3 Discussion

The Cross-level Theory represents a comprehensive behavioral theory that integrates individual behavior theory and group behavior theory. It involves both individual-level behavioral cognition and group-level social influence, aligning with social ecological theoretical assumptions about research problems. Cognition refers to people's understanding and perceptions of things. This theory abandons "knowledge" from the "Knowledge-Attitude-Practice" model, adopting effective cognitive components that encompass "behavioral beliefs" from the

Theory of Reasoned Action [8] and “problem perception” from the Perceived Belief-Reference Norm Theory [9].

Reference norms, institutional norms, and working/living environments constitute the elements of social influence theory. Through the paradigm combining individual and group theories, we can explore interactive relationships between these explanatory variables, facilitating comprehensive understanding of behavioral issues. In practical research operations, individual and social level analyses can be conducted. For example, for physical exercise, we can analyze relationships between individual cognition and organizational incentives on exercise behavior. Additionally, the model can explore the explanatory power of social influence on behavior under the premise of behavioral cognitive variables, and vice versa. During model analysis, the individual cognition component can sometimes be set aside to specifically explore how different aspects of social influence affect behavior.

Beyond exploring behavioral mechanisms, this theory can also be applied to intervention research. For instance, value clarification interventions targeting behavioral beliefs—referring to all efforts directed at people’ s concepts, including establishing healthy values, distinguishing right from wrong, clarifying what should and should not be done, and developing problem-solving abilities in dilemmas. For example, interventions for adolescent smoking should guide them away from misconceptions such as “smoking makes one manly” or “smoking facilitates socializing,” helping them master methods and skills for handling psychological stress and refusing cigarettes. Establishing desired behavioral beliefs can also be achieved through counseling and persuasion to deepen understanding and acceptance of issues. Problem perception strategies represent another behavioral intervention perspective, requiring creation of opportunities for problem perception and experience to resonate with people’ s core thinking, change attitudes, and form behavioral intentions. In cognitive behavioral interventions, combining “behavioral beliefs” and “problem perception” represents an optimal approach.

It should be emphasized that group interventions are more efficient than individual interventions. The authors advocate applying this theory to group interventions, primarily conducting intervention research on social influence aspects. For example, for stress management: establishing appropriate work goals to reduce excessive employee pressure; implementing transparent management norms and information to reduce uncertainty-related psychological stress; monitoring employee psychological stress and organizing recreational activities to reduce stress. These represent beneficial institutional stress management interventions. The aforementioned “tobacco control advocacy capacity” program illustrates this point well [16,17].

It should be noted that both the cognition-social influence theory and the Cross-level Theory include reference norms—namely, influence from others. Reference norms are part of the Theory of Reasoned Action, but conventional research only involves normative beliefs and compliance. Generally, reference norms only

affect small group behaviors, which is why the Theory of Reasoned Action is classified as an individual behavior theory. The cognition-social influence theory and Cross-level Theory emphasize the behavioral pressure from others' influence, treating it as part of social influence, and more importantly, incorporating the roles of group norms and living environment.

The Cross-level Theory is a comprehensive behavioral theory. This paper provides both theoretical foundations and real-world evidence support, preliminarily establishing the theory's validity and practical feasibility. However, due to different data sources used in this validation, the analysis had to be conducted from different perspectives, making comprehensive effect evaluation difficult. Currently, the theory only formally combines individual cognition and social influence, which, while valuable for behavioral research, still falls far short of deep theoretical integration and fundamental theoretical cognitive advancement.

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*Note: Figure translations are in progress. See original paper for figures.*

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