

Identification and theoretical response to the demand for home-school social medical collaboration in the digital age — — Empirical research based on adolescent mental health services

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Abstract. At present, the mental health services for young people in China are facing a prominent dilemma of the failure of the "family school social medicine" collaboration. However, the theoretical response of the academic community to the specific manifestations, deep causes, and solutions of the collaboration failure is still insufficient. This study uses the Browning Brenner ecosystem theory as the analytical framework, focusing on the collaborative mechanisms at the "mid-system" level. A comprehensive survey was conducted on parents' collaborative experiences, core pain points, and functional needs using questionnaire methods and semi-structured interview methods (N=6). Empirical research has found that over 70% of parents believe that the effectiveness of four-way linkage is poor, and information silos and process disruptions constitute the two core manifestations of collaborative failure; Parents' demands are highly concentrated in three directions: information synchronization communication, crisis emergency referral, and professional assessment tools, all of which essentially point to the reconstruction of the central system; 63.93% of parents prioritize privacy and security, which constitutes a rigid constraint in collaborative mechanism design - information sharing must be based on security as a prerequisite. Based on this, this study constructed a theoretical model of system collaboration in "home school social medicine" with digital technology as the link, clarifying the rights and responsibilities boundaries and interaction mechanisms of the four parties in the entire chain of "prevention screening intervention referral", providing a systematic theoretical explanation and framework reference for solving the collaborative dilemma, and pointing out the direction for system scheme design.

Keywords: Adolescent mental health; Family school community medical collaboration; Requirement analysis; Ecosystem theory.

1. Introduction

The collaborative dilemma of adolescent mental health services is no longer a new topic. Although families, schools, communities, and medical institutions (hereinafter referred to as "home school social medical institutions") are collectively recognized as the four core entities supporting the mental health of adolescents, in actual operation, the fragmented state of "gathering but not uniting, connecting but not moving" has become a common pain point that restricts service effectiveness. The biggest difficulty for parents when facing psychological distress in their children is not the lack of service ability from a single entity, but rather "not knowing who to contact and how to handle it quickly"; The achievements of mental health education in schools and the diagnosis and treatment information in hospitals are almost unable to be transmitted in both directions; The community has long been detached from the collaborative system. This situation of "going their separate ways" has led to frequent disruptions in the entire chain of "prevention screening intervention referral" for adolescent mental health services [1] [2].

Bronfenbrenner's ecosystem theory provides a classic framework for understanding the multi environmental interactions in adolescent psychological development, and numerous studies have confirmed the respective importance of family, school, community, and hospital at microsystem level. Dong Yan further pointed out that a support system covering the entire chain of prevention, intervention, and treatment is needed for adolescent mental health services. Previous studies have

fully analyzed the internal functional construction of each subject, but there is a lack of systematic theoretical construction and empirical analysis of the cross-subject interaction layer that connects each subject [3].

In response to the theoretical gaps mentioned above, this study focuses on the core issue of the failure of home school social medical collaboration. Using the Brown Finn Brenner ecosystem theory as the analytical framework, a comprehensive survey was conducted on parents' collaborative experiences, core pain points, and functional needs using questionnaire methods (N=122) and semi-structured interview methods (N=6). The aim is to answer three sub questions: the essential characteristics of collaborative failure, the real needs of all parties, and the theoretical explanation path. Furthermore, the concept of "middle system" is pushed from abstract description to concrete mechanism analysis, and a theoretical model of home school social medical collaboration in the digital age is constructed to provide theoretical basis for subsequent practical interventions.

2. Research Design

2.1. Analysis Framework: Browning Brenner Ecosystem Theory

This study is based on the ecosystem theory of Bronfenbrenner as the core analytical framework. This theory divides the environmental systems that affect individual development from the inside out into four levels: microsystems, mesosystems, exosystems, and macrosystems. Among them, microsystems refer to the environment in which individuals directly participate and interact, corresponding to the four main entities of family, school, community, and medical institutions in the context of adolescent mental health; The central system refers to the interaction and connection relationship between various microsystems, namely the collaborative mechanism between subjects such as home school, school community, and community hospital - this is the core level of concern in this study; External systems and macro systems respectively refer to the policy environment and social culture that indirectly affect individual development[4-6].

2.2. Research Methods and Samples

This study adopts a mixed research design combining questionnaire survey method and semi-structured interview method.

This study independently developed the "Green Heart Escort" Family School Social Medicine Linkage Parent Demand Survey Questionnaire, which was distributed to adolescent parents in primary and secondary schools across the country. The questionnaire covers five modules: basic information, collaborative status evaluation, core challenges, functional requirements, usage concerns, and promotion willingness. The core functional requirements are measured using the Likert 5-point scale. A total of 122 valid questionnaires has been collected, covering the lower grades of primary school (grades 1-3), the upper grades of primary school (grades 4-6), and the entire middle and high school range. SPSSAU was used to conduct reliability and validity tests and descriptive statistical analysis.

In addition, this study conducted one-on-one structured in-depth interviews with six parents from different age groups and family backgrounds (see Table 1 for interviewee information). The interview revolves around two major levels: the micro system (the current situation of direct interaction between families, schools, communities, and hospitals) and the meso system (the current situation, obstacles, and expectations of the four-party collaborative linkage). After transcribing the interview recording, Nvivo software was used for topic coding analysis [7].

Table 1. Interviewee Information.

No.	Child's School Stage	Child's Psychological Condition	Guardian Identity	Age
1	Lower primary grades	Mild emotional issues	Mother	33
2	Upper primary grades	No significant psychological problems	Father	38
3	Upper primary grades	Previously had relatively significant psychological problems	Mother	36
4	Middle school	Previously had relatively significant psychological problems	Mother	41
5	Middle school	Mild emotional distress	Older brother	25
6	High school	Mild emotional distress	Older sister	20

3. Empirical findings: characterization and demand for the failure of home school social medical collaboration

3.1. Assessment of the current situation of collaborative failure

The questionnaire data shows that parents have a generally low evaluation of the current collaboration and cooperation among schools, communities, and hospitals in supporting the mental health of adolescents. As shown in Figure 1, 48.36% of parents think that the linkage effect is "average", 16.39% think it is "poor", 9.84% think it is "very poor", and more than 70% (74.59%) of parents think that the four-way linkage effect is not good; Only 6.56% of parents believe that the linkage effect is "good" or "very good". This result confirms the practical urgency of the core issue of "inadequate collaborative mechanisms".

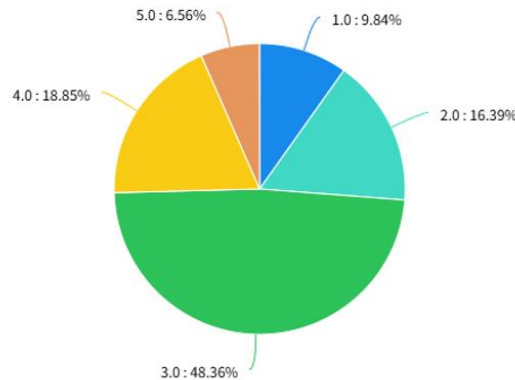


Figure 1. Frequency Statistics of the Current Status of School Community Medical Collaboration.
(Note: 1 represents very good, 5 represents very poor).

The interview data further revealed the specific features of collaborative distortion. The coding analysis shows that the "middle system" of four party collaboration is almost in a blank state. The interviewed parents generally reported that schools rarely proactively provide feedback to families on students' psychological status, whether the community and hospitals provide relevant services, and their communication with families. Parents are almost unaware of this, and there is almost no substantive communication between the four parties at the information level. Even parents who have taken their children to the hospital for psychological diagnosis and treatment have clearly stated that the diagnosis and treatment information is not and will not be synchronized to the school, and the information on the medical and educational ends is completely disconnected. This indicates that even if children receive professional medical intervention, diagnosis and treatment information cannot enter the campus support system, and the service chain is completely broken at this point.

3.2. The core characterization of collaborative failure

Based on cross-validation of questionnaires and interviews, this study summarizes the characterization of collaborative distortion into the following two dimensions:

3.2.1. Information island: Comprehensive blockage of cross-subject information flow

Survey data shows that information barriers are one of the core difficulties faced by parents: 41.80% of parents admit that they cannot identify their children's psychological problems due to a lack of professional knowledge, 33.61% of parents have no knowledge of the mental health services and activities provided by the community, and 28.69% of parents believe that communication channels with school teachers are not smooth and information is not synchronized. The interview results further confirmed this dilemma - all interviewed parents stated that hospital diagnosis and treatment information is never synchronized to schools, and community service information is almost never actively reached out to families. It can be seen that apart from limited communication between families and schools, the information between communities and hospitals is almost completely detached from the cognitive and collaborative scope of families and schools, and an information island has formed between the four parties.

3.2.2. Process rupture: Lack of collaborative mechanism in crisis situations

Quantitative data and interview materials collectively point to a deeper issue: the rupture of services does not lie in the scarcity of resources in a certain link, but in the gap of cross subject emergency response mechanisms. A survey shows that 36.89% of parents do not know who to contact and how to handle their children's psychological crisis quickly, which is significantly higher than the medical barriers of "difficult registration and complicated consultation process" (18.03%). This means that the pain point for parents is not the lack of access to medical resources, but the lack of a clear and standardized cross-subject emergency response process.

4. Theoretical Response: Construction of System Collaboration Model in Family School Social Medicine

4.1. Theoretical Model Analysis Basis

Empirical research has revealed a set of seemingly contradictory yet insightful findings. On the one hand, over 70% of parents perceive collaboration failure, and this dilemma is highly consistent in the dimensions of information silos and process disruptions, indicating that the "lack of a middle system" is not a subjective feeling of individual families, but an objective structural dilemma. On the other hand, parents have an urgent need for cross subject collaboration functions such as information synchronization, emergency referral, and professional evaluation, but they prioritize privacy and security as the primary constraint. This indicates that parents are not rejecting collaboration itself, but rather rejecting collaboration that lacks security and professional guarantees.

The above findings shift the crux of the problem from whether collaboration should be pursued to how to collaborate safely and effectively. Browning Brenner's concept of the mesosystem provides a theoretical anchor for this question: the mesosystem essentially refers to the interactive relationships between microsystems, which can be spontaneous, scattered, or mechanistic and structured. Based on this, this study further clarifies the theoretical task as explaining the mechanisms and principles that should be followed for structured collaboration in the context of the digital age [7-10].

4.2. Core architecture of the model

Based on empirical findings and ecosystem theory, this study constructed the "Family School Social Medicine System Collaboration Model". The model is divided into three levels from the inside out:

The first layer: microsystem layer - the functional positioning of the four main bodies. Based on research data and existing studies, clarify the core rights and responsibilities of the four parties in the

entire chain of services: the family is the first responsible subject, responsible for daily supervision, emotional observation, and basic companionship, and is the "first discoverer" of psychological problems; Schools are the main battlefield for education, responsible for mental health education, daily screening, initial intervention, and information reporting; The community serves as a grassroots support carrier, undertaking science popularization propaganda, offline activity organization, and follow-up of high-risk groups; Medical institutions are the main body of professional diagnosis and treatment, responsible for professional evaluation, diagnosis and treatment, and rehabilitation guidance.

Second layer: Mid-system layer - collaborative mechanism empowered by digitalization. This is the core innovation layer of this model, which responds to the two major collaborative failure manifestations found in empirical research: (1) a hierarchical information sharing mechanism - to address the problem of information silos, establish an information flow rule of "parental authorization targeted push", distinguish between normal information (which can be shared within a limited scope under parental authorization), crisis information (automatically pushed desensitized information after triggering warnings), and private information (strictly isolated and only visible to oneself), fundamentally solving the problem of "diagnosis and treatment information not entering the campus"; (2) Standardized process collaboration mechanism - In response to the problem of process breakage, the operating procedures for each link of "prevention screening intervention referral rehabilitation" are solidified into traceable collaborative processes, clarifying the responsible parties, triggering conditions, and information transmission directions for each step.

Third layer: Constraint layer - Privacy and security priority principle. Empirical evidence shows that 63.93% of privacy concerns constitute the rigid constraints of the model. The model establishes three principles of "informed authorization, minimum necessity, and full process encryption": all cross-subject information transmission requires parents to be informed and actively authorized in advance; The scope of information sharing is limited to the minimum necessary to solve the current problem; All sensitive information transmission and storage are encrypted. This constraint layer also answers the question of 'how to make parents willing to collaborate' - a sense of security is a prerequisite for collaborative willingness.

4.3. Theoretical innovation of the model

This model achieves the following three theoretical advances based on ecosystem theory:

Firstly, shift the concept of 'middle system' from descriptive to mechanistic construction. Browning Brenner's original theory focused more on descriptive definition of the central system ("interactions between microsystems") but did not delve into how these interactions are structured and institutionalized. This study is based on empirical data and concretizes the concept of the central system into two operational dimensions: the "hierarchical information sharing mechanism" and the "standardized process collaboration mechanism", enabling the concept of the central system to serve as a theoretical analysis tool.

Secondly, it reveals the dual role of privacy and security in the construction of systems. Previous studies have often regarded privacy protection as a subsidiary issue of technological implementation. However, this model, based on empirical evidence, elevates privacy and security as a prerequisite for the establishment of the central system. Without sufficient security guarantees, the central system cannot gain user trust and thus cannot generate substantial collaborative efficiency.

Thirdly, the instrumental positioning of digitalization in the central system has been clarified. The model positions digital technology as a 'technology carrier of the middle system' rather than a 'service provider'. This means that the core function of technology is not to replace the professional services of any entity, but to provide a secure and efficient channel for information flow and process connection between the four parties. This distinction avoids the misconception of the "omnipotence of technology" and provides a clear value orientation for subsequent practical interventions.

5. Discussion

This study uses the Browning Brenner ecosystem theory as the analytical framework, based on empirical data from 122 parent questionnaires and 6 in-depth interviews, to analyze the problem of the failure of the "home school social medicine" four-party collaboration. The following core conclusions are drawn.

Firstly, the failure of collaboration can essentially be attributed to the structural absence of the 'middle system'. Empirical data show that over 70% of parents believe that the linkage effect between the four parties is not good. This dilemma is mainly reflected in two forms: information silos and process fractures. Hospital diagnosis and treatment information cannot enter the campus, community service information is difficult to reach the family, and parents do not know who to turn to for help and how to solve their children's psychological crisis. These problems do not stem from weak internal capabilities of any particular entity but rather reflect a lack of effective mechanism arrangements at the intermediate system level that connects various entities.

Secondly, parents' needs are highly concentrated on the reconstruction of the central system. Among the various functional requirements, information synchronization communication (81.9%), crisis emergency referral (77.8%), and professional evaluation tools (75.4%) rank among the top. These three are not extensions of the responsibilities of a single entity, but direct demands for the construction of cross entity collaborative mechanisms. At the same time, 75.41% of parents expressed willingness to use and recommend tools to others on the premise of safety and compliance, which further confirms the authenticity and urgency of the demand.

Thirdly, the rigid constraints of system construction in the composition of privacy and security. 63.93% of parents consider privacy breaches as their primary concern, indicating that any collaborative solution aimed at breaking down information barriers must prioritize security before information sharing, following the three basic rules of informed consent, minimum necessity, and full encryption.

This study also has certain limitations. Firstly, the research sample mainly focuses on the parent group, and there has not been a systematic survey of school psychological teachers, community workers, and medical institution professionals at the same depth. The differences in needs among the four parties need to be further revealed. Secondly, the sample size is 122, which meets the basic requirements of exploratory research. However, subsequent studies can enhance the robustness of the conclusions by expanding the sample size and conducting regional comparisons. Again, this study focuses on the construction of theoretical models, and the operability and practical effectiveness of the models still need to be tested through subsequent practical interventions and effectiveness evaluations. Future research can develop specific collaborative tools within the framework of this model and conduct pilot applications to verify the effectiveness of the model through empirical data and continuously iterate and optimize on this basis.

6. Conclusion

This study constructed a "collaborative model of home school social medical system", clarifying the core functions, operating principles, and technical positioning of the system, providing a testable theoretical framework and practical direction for the collaborative governance of adolescent mental health services in the digital age.

Future research can promote the development and pilot application of specific collaborative tools within the framework of this model to empirically test the actual effectiveness of the system collaboration mechanism, and to continuously explore the adaptation boundaries and optimization directions of digital technology in the collaborative governance of adolescent mental health services.

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