

Research Paper

Presenting a Causal Model for the Design Components of Residential Complexes Based on Addressing the Need for Self-Actualization

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Abstract

In the current century, the crisis of meaning and the loss of individual identity underscore the need to focus on self-actualization as a viable solution. Self-actualization is a psychological necessity, and it is crucial to leverage all environmental capabilities to facilitate individuals' self-actualization. This study aims to introduce a causal model for the design components of residential complexes centered on residents' self-actualization. The research was conducted in three phases: 1) document analysis using the Delphi method, 2) a survey-based second phase, and 3) correlation analysis. The study begins with an examination of resources, supplemented by expert insights gathered using the Delphi method, which was chosen for its capability to achieve group consensus through expert judgment. A researcher-made questionnaire was developed for users, and design components effective for self-actualization were identified using R-factor analysis. The theoretical model of the research components was presented, and its validity was assessed using Amos software. The results indicated that the factors influencing the design of residential complexes, based on self-actualization, included Creative Environment, Eventful Environment, Diversity, Collaborative Environment, Interactive Environment, Environmental Safety, and Discoverability. Consequently, it can be acknowledged that a social environment that is safe and secure, where environmental events can occur, and where creative participation is encouraged, can significantly support individuals' self-actualization. This study contributes a novel causal model that elucidates the relationships among the design components of residential complexes, with an emphasis on promoting residents' self-actualization.

Keywords: Residential Complexes, Housing, Human Needs, Desirable Housing, Self-Actualization.

INTRODUCTION

In the transition to the new era, where the lack of attention to individuality in contemporary culture has weakened traditional frameworks of identity construction and put them in conflict with each other, the importance of understanding who a person is and their nature becomes evident. Self-actualization is

the main motivation of humans and a fundamental concept in humanistic psychology, which humanists consider to be the core principle of perfection and mental health (Frankl, 2021). The concept of self-actualization, as the most important motivation and the highest need of every human being, can address constant questions such as "Who should I be?" and "How should I live?" (Marks, 1979). Self-

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actualization or self-realization means the full realization of one's capabilities and is synonymous with terms such as self-realization, self-reflection, or self-exploration (D'Souza, 2018).

Achieving levels of self-actualization provides a person with a sense of hope and fosters a positive attitude towards oneself, life, and the surrounding world (Ruf, 1998; Maslow, 2019). Conversely, failure to pay attention to the need for self-actualization in the design of the spaces will cause a lack of sense of belonging to the space and the lack of flexibility of the spaces (Alaghemand et al., 2019). Neglecting this need leads to despair and meaninglessness (Schultz & Schultz, 2021). Ultimately endangering individuals' mental health. Therefore, to avoid disappointment and meaninglessness in life, paying attention to self-actualization as an answer to the question of who and what a person is, and as a means to foster a positive approach in individuals, is crucial.

Meeting the need for self-actualization in the living environment is among the basic human needs and encompasses the most common desire of every person (Zhang et al., 2019). Thus, every individual tends to address and fulfill their need for self-fulfillment in life. Residential space is one of the most important and influential environments surrounding individuals, and therefore it can provide a suitable platform for achieving self-actualization. A house that significantly aids an individual in the journey toward self-actualization can be considered a desirable home, and without a doubt, it is more successful in this regard due to its higher degree of desirability (Zabihi, 1999). Recognizing and addressing the need for self-actualization within residential spaces can create an environment where the desires and needs of residents are not only acknowledged but also met.

Residential spaces emerge as pivotal settings for meeting the need for self-actualization, facilitating a process where deep and meaningful connections between individuals and their environment are established. This connection, in turn, leads to the creation of desirable living spaces where individuals achieve self-fulfillment through their residency. This research focuses on the architectural space of residential complexes, considering its broad social, activity, and physical dimensions. Despite the potentially enduring positive effects, achieving self-actualization through residential spaces has not been independently explored, making it a critical subject for investigation.

The current research endeavors to present a causal model of the design components of residential

complexes based on the self-actualization of residents. It introduces the design components, establishes an elegant model based on their relationships, and identifies the mediating role in these relationships. Recognizing the effective factors and the model conducive to self-actualization in residential complexes can significantly contribute to residents attaining various degrees of self-actualization. The positive repercussions of this attainment extend to all facets of an individual's life, thereby enhancing the overall quality of life and positively impacting the society.

In light of the research problem statement, two research questions arise:

RQ1: What are the architectural components of residential complexes that support residents' self-actualization?

RQ2: Which design model among the components of residential complexes best embodies residents' self-actualization?

LITERATURE REVIEW

Research conducted to date by scholars in the fields of architecture and urban planning has examined the concept of self-actualization within the hierarchy of human needs and the environment responsive to those needs. This includes studying self-actualization independently in the contexts of housing, educational environments, and urban areas. However, no specific and desirable model has been presented regarding the factors affecting the self-actualization of residents in residential complexes. Therefore, this research aims to explore self-actualization specifically in the field of housing, particularly residential complexes, and to present the design components of residential complexes based on the self-actualization of residents. Ultimately, the research proposes a causal model of these design components to achieve self-actualization for the residents.

The term self-actualization was first proposed by the neuroscientist Kurt Goldstein in 1939, describing it as a tendency to actualize all aspects and individual capabilities (Goldstein, 1993). The first manifestation of flourishing is evident in Aristotle's philosophical thinking; his concept of "perfection" refers to the complete realization of potential. The term self-actualization is a modern interpretation of an ancient concept that has been openly expressed since Aristotle's time in the fourth century BC and in his causal system. This old saying posits that every human being has unique potentials that seek realization. Jean-Paul Sartre also considers self-

actualization one of the ways to find meaning (Yalom, 2023, pp. 394-606).

In recent research, the issue of self-actualization has been repeatedly investigated, and some research has specifically addressed this issue in architectural spaces. The following are some relevant studies and their results:

In the field of housing and self-actualization, Kim and Kim (2017) investigated the performance of residential spaces concerning human needs. Their study indicated that attention to self-esteem and self-actualization needs in housing manifests as comfort, independence, economy, sociability, relaxation, and expression. They found that individuals should engage in activities that express their talents in separate spaces to develop their potential.

Regarding the meaning of housing, Karimi et al. (2018) revisited the relationship between the dweller and the dwelling, seeking to understand how housing motivates people to search for meaning. They focused on housing readability and the inferential meaning perceived by residents, categorizing housing into three types: readable and familiar, questionable and imaginary, and transcendental.

In research on smart city evaluation based on the hierarchy of needs, Zhang et al. (2019) evaluated smart cities concerning residents' needs. Their overall assessment, considering the five levels of the need's hierarchy, showed that the highest demand among intelligent functions is related to self-actualization needs, followed by social needs, with physiological needs being the lowest.

Alaghamand et al. (2019) examined the design components of university collective spaces to respond to self-actualization needs. Their results indicated that the most important traits in these spaces, which lead to students' self-actualization, include privacy, presence, simplicity in environmental organization, and sociability.

Rubiyanti (2023) in his paper addresses the challenges of residential design amid urban development and social change, emphasizing the need to maintain quality of life. The research uses Design Thinking to develop inclusive, ergonomic, and adaptable housing, incorporating room layout, natural lighting, ventilation, eco-friendly materials, and advanced technologies. The goal is to provide actionable design recommendations to improve community well-being for architects, planners, and developers.

Istrefaj and Kumaraku (2023) in their research examined the impact of the COVID-19 pandemic on

housing needs and proposed solutions for a post-pandemic society. They emphasized the need for new housing concepts that address increased demands for indoor comfort, air quality, natural light, ventilation, and flexible spaces. The research workshop produced two main approaches: adapting existing housing and developing new models that integrate nearby public spaces and self-sufficient building concepts.

Kamata and Kawakubo (2024), in their research, developed a hierarchy of housing needs to enhance residents' well-being, categorizing elements into safety, health, convenience, comfort, and sustainability. Findings revealed that residents' well-being improved progressively with the fulfillment of these needs, with the highest scores for those meeting all five categories. Notably, satisfaction with sustainability contributed significantly to overall well-being.

In summary, existing research highlights the importance of self-actualization in various environments, including housing, educational spaces, and urban areas. Studies have shown that addressing self-actualization needs in residential spaces can lead to improved well-being and personal growth. However, there remains a gap in the literature regarding a specific and comprehensive model that identifies and integrates the design components of residential complexes conducive to self-actualization. This paper aims to fill this gap by presenting a causal model of the design components of residential complexes based on the self-actualization of residents. This exploration not only addresses a critical aspect of human needs in residential design but also provides valuable insights for architects, urban planners, and policymakers aiming to create more fulfilling living environments. The mentioned researches are presented in Table 1 with an emphasis on the purpose and the results obtained:

Table 1. Review of the Background of the Research with Emphasis on the Goal and Results

Kim and Kim (2017). The Relation between Housing Needs and Housing Function according to the Maslow's Theory of Needs		
Housing and self-actualization	Investigating the related performance of residential space and human needs	The results of the study indicate that addressing the needs for self-esteem and self-actualization in housing involves aspects such as comfort, independence, economic considerations, sociability, relaxation, and expression. To foster the development of individual talents, a person should focus on creating a space that supports and expresses recreational activities.
Karimi et al. (2018). The Relationship between the Dweller and the Dwelling Revisited		
The meaning of housing	Trying to find a home that motivates people to search	This study emphasizes the importance of housing readability and the inferential meaning residents attribute to their homes as pioneering factors in the relationship between residents and housing. It categorizes housing that interacts with residents into three types: readable and familiar housing, questionable and imaginary housing, and transcendental housing.
Zhang et al. (2019). Research on Smart City Evaluation Based on Hierarchy of Needs		
City and response to needs	Evaluation of smart cities based on residents' needs	The results of the overall assessment regarding the five levels of the need hierarchy indicate that, among these levels, the highest demand among individuals is related to meeting the need for self-actualization, followed by social needs. The lowest demand is associated with physiological needs.
Alaghmand et al. (2019). Designing Components of University's Communal Spaces in Order to Response to Self-Actualization Need		
Educational space and self-actualization	Extracting the design components of the university's collective spaces	The results of this study showed that the most important traits necessary in the collective spaces of the university to foster students' self-actualization are privacy, presence, simplicity in environmental organization, and sociability.
Rubiyanti (2023). Design for Well-being: An Innovative Method of Home Design to Enhance Community Quality of Life		
Housing and well-being	providing actionable design recommendations to improve community well-being for architects, planners, and developers.	in his paper addresses the challenges of residential design amid urban development and social change, emphasizing the need to maintain quality of life.
Istrefaj and Kumaraku (2023). Innovative housing models that reflect the needs of contemporary society		
Housing and needs	Examining the impact of the Covid-19 pandemic on housing needs and proposing solutions for a post-pandemic society.	The research workshop produced two main approaches: adapting existing housing and developing new models that integrate nearby public spaces and self-sufficient building concepts.
Kamata and Kawakubo (2024). Housing hierarchy of needs that contribute to the well-being of residents		
Housing and needs	identifying a housing hierarchy of needs for realizing residents' well-being.	Findings revealed that residents' well-being improved progressively with the fulfillment of these needs, with the highest scores for those meeting all five categories. Notably, satisfaction with sustainability contributed significantly to overall well-being.

THEORETICAL FRAMEWORK

Housing

Housing refers to a place of peace and residence, where people live (GhorbaniSisakht & Yazdanpour, 2013, p. 2). *The Merriam-Webster Dictionary* defines "housing" as "the shelter, lodging, or accommodations provided for people" (Merriam-Webster, n.d), while the *Oxford English Dictionary* describes it as "the buildings or structures in which people live" (Oxford English Dictionary, 2024). According to the *Dictionary of Dekhoda*, housing in its formal sense includes terms such as house, residence, and a place of calm and comfort. It is a local environment that fulfills

the needs for comfort, peace, and security (Dekhoda, 2006). These definitions highlight the dual role of housing in providing both physical shelter and contributing to the overall living environment. The home is the primary setting where individuals experience space both in isolation and in social interactions (Haeri, 2016). Marcus (2022) views the house as a symbol of oneself, explaining that "The house may be seen in two ways: first, as a direct manifestation of oneself, where mental messages flow from oneself to its objective symbol; and second, as a means of discovering and intuiting one's nature, where messages return from the objective symbol to oneself" (Marcus, 2022, p. 59). Table 2 presents the definitions provided by experts regarding this term.

Table 2. Definitions Provided by Experts of Housing

Theorist	Definition provided
Rapoport (1969)	The house is an institution created for complex purposes. The positive aspect of the concept of home is the formation of a desirable environment for the life of the family as a social unit.
Le Corbusier (2021)	The house serves as a cover that, under certain conditions, establishes the proper relationship between the external environment and human biological phenomena.
Bachelard (2022)	The house is a place for foresight and dreaming, allowing individuals to immerse themselves calmly in fantasy.
Miller (2007)	Motivational factors influence residents' choices in housing design, and the self-esteem and self-actualization of the household members also drive them to shape the living environment according to their expectations.
Marcus (2022)	The house is a symbol of oneself and a reflection of one's own gaze.

Self-Actualization

The term "self-actualization" is defined in *the Oxford Dictionary* as growing with enthusiasm, progressing, succeeding, and excelling. Derived from the Latin word "flor", meaning flower, which in turn comes from the Indo-European root "bhlo", meaning to bloom, self-actualization metaphorically refers to the blooming of flowers. This concept signifies the realization of one's inherent nature and the enhancement of personal well-being within an environmental or social context (Gokcen et al., 2012, p. 4). According to the Academy of Persian Language and Literature, "self-actualization" is defined as realizing the maximum potential abilities of a person by oneself (Academy of Persian Language and Literature, 2023).

The concept of self-actualization represents a modern interpretation of an ancient idea articulated since Aristotle's time in the fourth century BC within his doctrine of final causes, which posits that the ultimate aim of every being is self-sufficiency. Known by various names such as "self-fulfillment", "self-realization", "self-development", "potential development", "growth", and "autonomy" (Yalom, 2023, pp. 394, 606), as well as "self-reflection" and "self-exploration" (D'Souza, 2018), the fundamental concept remains simple: each human being possesses a set of intellectual capacities and potentials and an innate, primary awareness of these potentials within themselves (Yalom, 2023, p. 394). Maslow views self-actualization as an ongoing developmental process leading to optimal mental health (Schultz, 2022).

RESIDENTIAL COMPLEX

A residential complex refers to a planned development that includes multiple housing units, such as apartments, townhouses, or single-family homes, designed to create a cohesive community environment. These complexes often feature shared amenities like green spaces, recreational facilities, and

community centers, fostering social interaction and enhancing the quality of life for residents. The design of residential complexes increasingly emphasizes sustainability, incorporating eco-friendly materials and energy-efficient technologies to minimize environmental impact (Gehl, 2017; Farr, 2018).

These complexes are often designed with considerations for accessibility, security, and the efficient use of space, aiming to offer residents not just a place to live, but a high quality of life that supports well-being and environmental responsibility (Leupen & Mooij, 2011). The blocks of a residential complex may range from single- to two-story villas, multi-story apartment blocks, or high-rise blocks in the shape of a tower (Ramyar, 2012, as cited in Jalalian et al., 2022).

Self-Actualization in Residential Space

In residential spaces, motivational factors influence residents' choices in housing design. The self-esteem and self-actualization of the household members also drive them to shape their living environment according to their expectations (Miller, 2007). To achieve self-actualization within a housing space, the home must first support the lifestyle that individuals envision for themselves. Additionally, the house should symbolize the transcendent self of humans, possessing qualities that elevate the human condition and lead to self-actualization (Karimi et al., 2018).

An "Ideal House" is a structure that meets all human needs. The evaluation of a house can be based on the extent and nature of the needs it satisfies (Estaji, 2014). An ideal house integrates its elements harmoniously and reveals the profound meaning of residence. Therefore, an ideal house can be understood as a structure imbued with concepts and criteria that foster human perfection (Azemati et al., 2017). When individuals choose to live in a space that provides and fulfills their needs, they achieve self-actualization (Khatibi et al., 2018).

Housing, initially regarded as a fundamental structure designed to meet basic needs, ultimately has the potential to address the psychological and emotional needs of its residents. In the contemporary world, housing is not merely considered a shelter but rather a space that, through the process of habitation, can contribute to the growth, self-improvement, and fulfillment of its occupants. Therefore, it is crucial to recognize that residential spaces, given their purpose and the expectations individuals have of these spaces, must play a significant role in enhancing personal growth, achieving self-actualization, and ensuring mental well-being. In this context, addressing human needs at various levels, with self-actualization as the highest need, can lead to the creation of an ideal and responsive home that fosters individual growth and flourishing.

Ultimately, housing should be viewed as a key element in fulfilling psychological and emotional needs, rather than merely as a place to live. By designing residential spaces that cater to self-actualization needs, we can enhance the quality of life and mental health of residents, contributing to their personal growth and fulfillment. This approach transforms housing from merely a shelter into an environment that actively supports individual development and flourishing.

RESEARCH METHODS

The current research was conducted using a mixed-method approach (quantitative and qualitative). The first phase of the study combines quantitative and qualitative methods, the second phase uses a quantitative approach, and the third phase employs a qualitative method.

In the first phase, the research aims to examine the background of the study and extract the architectural factors and spatial attributes that contribute to self-actualization. The Delphi method is then implemented to verify these effective criteria for self-actualization. This method included interviews with 21 experts in the fields of architecture and psychology, selected using the snowball sampling method, to investigate the factors affecting self-actualization in residential complexes. The statistics of the experts participating in the research are presented in Table 3:

Table 3. Frequency of Experts Participants Based on Gender and Fields of Study Using the Delphi Method

	PhD in Psychology	PhD in Architecture and Urban Planning	Total
Women	3	9	12
Men	1	8	9
Total	4	17	21

The Delphi method was conducted in two stages, and these steps led to the preparation of a researcher-designed questionnaire based on the Delphi method results. The questionnaire was used to survey users after confirming its content, structural validity, and reliability.

In the second phase, users were surveyed. The sample size was 290 people, according to Kline (2023), who suggested five participants for each item. he refers to a minimum sample size of 200 participants for factor analysis but notes that larger samples enhance the accuracy of the analysis and the reliability of the results. Therefore, a sample size of 290 participants in this study is considered adequate. The sampling of the studied complexes was done using a random cluster method and included five complexes in Shiraz City. The residential complexes under study include the Darak, Mab'ath, Jannat, BuAli, and Modarres complexes. The distribution of residents in these residential complexes based on gender is shown in Table 4:

Table 4. Frequency of Respondents to the Questionnaires in the Second Phase of the Research

	Total	Percent
Men	161	55.5
Women	129	44.5
total	290	100

As shown in Table 4, 55.5% of the respondents are male, and 44.5% of the respondents are female. The information obtained from the survey of residents of residential complexes was entered into SPSS.23 software for R-factor analysis, which was implemented to identify effective components in the design of residential complexes based on self-actualization. In factor analysis using R, responses are classified, and each factor consists of a set of questions that represent the shared cognitive perspective of the respondents on the subject (Keikha, 2015).

The third phase, using the correlation method, utilized the survey results for modeling. Structural equation modeling (SEM) refers to a set of related processes, and in existing literature, different terms such as covariance structure analysis, covariance structure modeling, and causal modeling have been used to describe it (Kline, 2023). SEM is a type of correlation analysis that involves a specific causal structure between a set of latent variables and observable variables (Habibi & Kolahi, 2022). In the third phase of this research, to present the structural model based on the theoretical foundations, a communication network between seven factors extracted from the survey results was developed as

preliminary modeling. Path analysis¹, a causal modeling approach to understanding the patterns of correlation and covariance among a set of variables, was used to develop the model (Kline, 2023). The theoretical model was then modified and refined using Amos software.

Lastly, based on the provided causal model, the research variables, including the independent and dependent variables, were identified. Amos software was used to measure the acceptability of the model, its suitability, and the significance of the relationships between the factors. This helped determine the effect of each variable, how the variables influence each other, and report the relationships between the variables in the real world.

The reliability and validity of the questionnaire are always set as criteria by the researchers in order to evaluate the quality of the scale. The validity of the researcher's questionnaire depends on the validity and reliability of its questions, and a test should be reliable

in order to be valid. Therefore, the researcher must ensure its validity and reliability scientifically before using the questionnaire tool (Mohammedbeigi et al., 2014). In the present study, Cronbach's alpha coefficient was used to determine the reliability of the user questionnaire. A Cronbach's alpha coefficient of 0.969 was estimated, which is an acceptable coefficient and indicates the validity of the current research questionnaire.

In every research project, determining the validity of the instrument, including the content and construct validity, should be checked and evaluated (Mohammadbeigi et al., 2014). Therefore, due to the importance of a detailed examination of validity in this research, the validity of the instrument has been fully investigated. Face validity was determined using the theoretical consensus of the experts, content validity was determined using the purpose-content table, and structural validity was determined using factor analysis. The research process is presented in Figure 1.

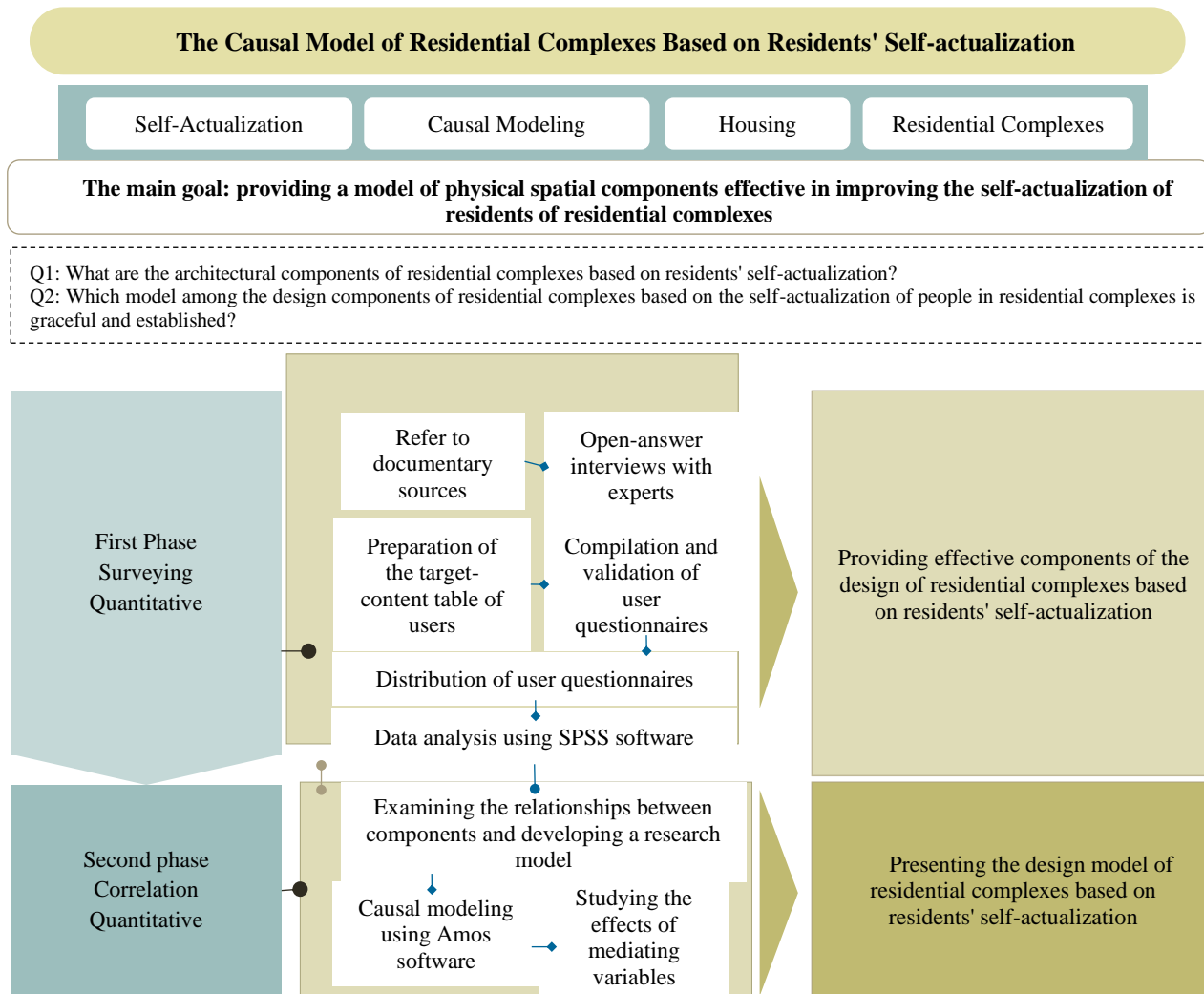


Fig 1. The Formation Process of the Current Research Stages

¹ The method is also known as structural equation modeling (SEM), covariance structural equation modeling (CSEM), and

covariance structure analysis. (National Institute of Mental Health, 2024)

FINDINGS

After entering the information into SPSS software and conducting factor analysis, the adequacy of the measurement indicators was examined, with the KMO index calculated at 0.928 at this phase of the research. Thus, the sample size adequacy is considered very suitable. Additionally, the significance level of Bartlett's test is 0.000, confirming the factorability of the data. As shown in the scree diagram (Figure 2), the hypothetical line of the diagram breaks after the 11th component and starts to flatten; the first and second factors are significantly larger and have a higher level of significance.

According to the rotated data matrix statistics, definable and meaningful components can be identified and placed in the relevant categories. In this step, the significant factors were identified, and the questions that included them were investigated. Then, each component was defined (Table 5).

The naming of the concepts was reviewed and revised by five experts and ultimately received approval from the supervisor. As a result, the user survey indicated that the seven components "creative environment", "adaptable environment", "diversity", "collaborative environment", "interactive environment", "environmental safety", and "discoverability" have been identified as key elements in the design of residential complexes that influence the self-actualization of residents. These components are grouped as shown in Figure 3.

To formulate the communication network research model, the seven components of the study are presented in the form of a modified and final model of the factors that constitute the design of residential complexes based on the self-actualization of residents. During the process of refining the model, the significance of the relationships between the components was examined, and ultimately, relationships that were statistically insignificant and had weak theoretical foundations were removed. Here, the main criterion for retaining relationships was their theoretical basis. As shown in Figure 4. In the presented model, the path coefficient of each variable is indicated on the corresponding arrow.

The details of the effects of the variables, including the standardized direct effects, standardized indirect effects, standardized total effects, and the standard errors related to the bivariate effects of the variables are presented in Table 6.

As shown in the table, the relationship between the Interactive Environment and the Collaborative Environment has the strongest direct effect, with a

significance level of 99%. Additionally, the relationship between the Collaborative Environment and Environmental Safety is also strong and statistically significant at the 99% confidence level. In contrast, the relationship between the Collaborative Environment and Diversity is not statistically significant, but it has been retained due to its significant indirect relationship.

To assess the fit and acceptability of the presented model in Figure 4, the fit and acceptability indices of the model are provided in Table 7.

Table 7 shows that all the aforementioned indicators confirm that the modified model has been approved and accepted at the 'perfect fit' level. The coefficient used to estimate the magnitude of the model's effect on the research variables is presented in Table 8.

According to Table 8, it can be noted that in the model developed in the current research, the "diversity" component is affected by approximately 47.8%, the "interactive environment" component by about 42.5%, the "environmental safety" component by around 21.1%, the "creative environment" component by about 31.7%, the "collaborative environment" component by approximately 16.4%, and the "eventful environment" component by about 15.4%.

Considering the operational error estimation of the variables and the significance of the operational errors presented in Table 9, it can be noted that the model compiled in this research can be developed from points e1, e2, e3, e4, e5, and e6. This indicates that there are indirect relationships among these points, which create the potential for expansion within the model. The estimates also demonstrate the influence of external intervention variables that can affect the relevant factors. At point e7, related to the "discoverable environment" factor, the model is complete and does not change.

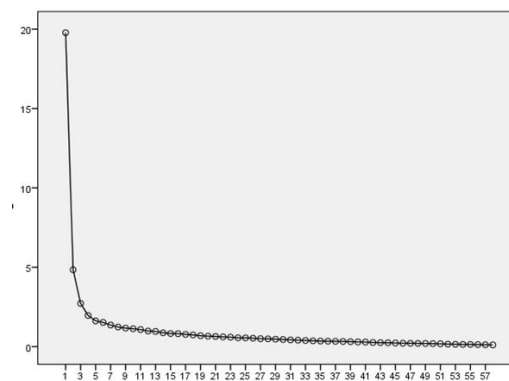


Fig 2. Scree Plot

Table 5. Labeling the Factors Resulting from the Factor Analysis with Their Question Number

Group number	Components	Question number
Group 1	Creative Environment	24, 22, 25, 1,30, 26, 20, 29, 2, 33, 7, 6, 41, 9, 27, 12, 5, 10, 48
Group 2	Eventable Environment	57, 58, 56, 21, 16, 46, 11, 18, 23
Group 3	Diversity	35, 55, 37, 42, 39, 38, 36
Group 4	Collaborative Environment	50, 51, 52, 53, 49, 54
Group 5	Interactive Environment	43, 44, 45, 19
Group 6	Environmental Safety	32, 31,40,28
Group 7	Discoverability	15, 13, 47, 14



Fig 3. Classification of the Components Resulting from R-Factor Analysis

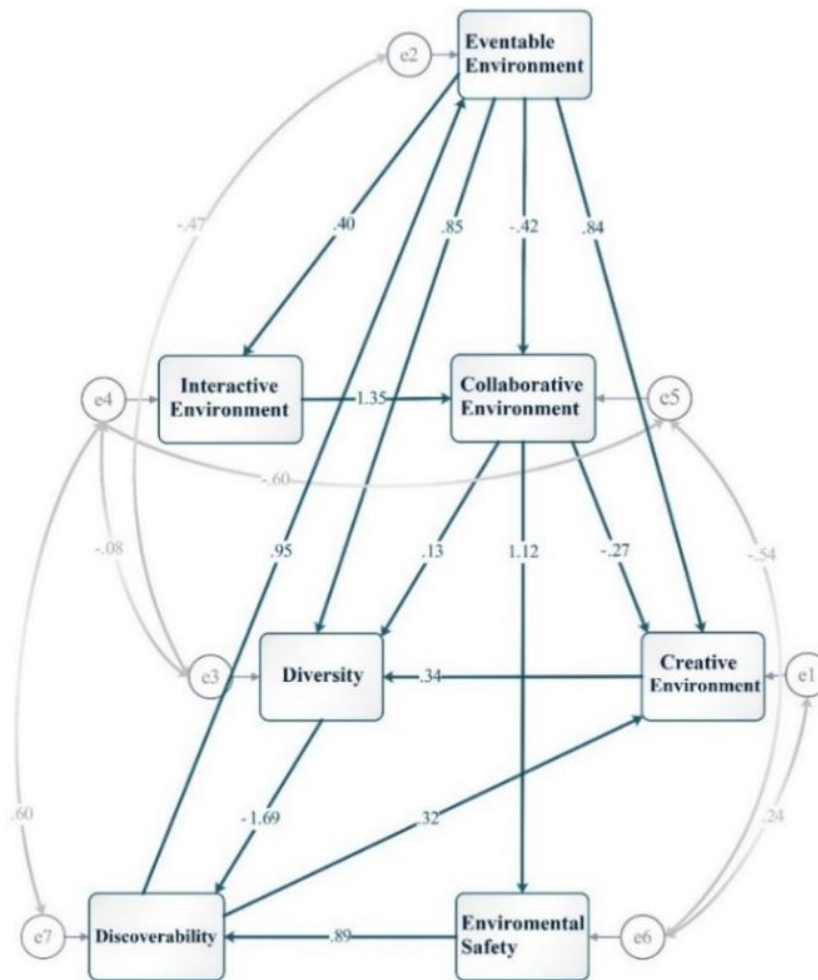


Fig 4. The Final Model of the Research by AMOS

Table 6. Standardized Direct and Indirect Effects and Standardized Total Effects

Construct	Standardized Direct Effects (Standardized Regression Weights)	Standardized Indirect Effects	Standardized Total Effects	Standard Errors
Diversity ← Collaborative Environment	.128	-.499**	-.372*	.068
Creative Environment ← Discoverability	.318**	.030	.348**	.084
Interactive Environment ← Eventable Environment	.396**	-.245**	.150**	.102
Discoverability ← Environmental Safety	-.895*	.608*	-.287*	.620
Discoverability ← Diversity	-1.690*	1.148*	-.542**	1.778
Environmental Safety ← Collaborative Environment	1.123**	-.040	1.084**	.149
Diversity ← Creative Environment	.345**	-.222*	.122**	.066
Collaborative Environment ← Eventable Environment	-.423**	.465**	.042	.157
Creative Environment ← Eventable Environment	.839**	-.739**	.100	.093
Eventable Environment ← Discoverability	.949**	-.644**	.304**	.173
Creative Environment ← Collaborative Environment	-.271**	-.370*	-.641**	.108
Collaborative Environment ← Interactive Environment	1.347**	-.048	1.299**	.183
Diversity ← Eventable Environment	.847**	-.486*	.362**	.103

P < 0.01 = **, P < 0.05 = *, P > 0.05 = -

Table 7. The Comparison of Goodness of Fit Indices and Model Fit Results

	Fit Index	Model Results	Comments	References
Absolute Fit Indices	Goodness of Fit Index GFI	1.000	Perfect fit	Rehman et al., 2015,
	Adjusted Goodness of Fit Index AGFI	.999	Perfect fit	Jöreskog & Sörbom, 2001
	Root Mean Square Residual RMR	.012	Perfect fit	Brown 2015
	Probability Level P	.981	Perfect fit	Byrne 2016
	Chi square CMIN	.038		
	Degree of freedom DF	2	Perfect fit	-
	CMIN/DF	.019	Perfect fit	Gefen et al., 2000
Relative Fit Indices	Tucker-Lewis Index TLI	1.018	Perfect fit	Hu & Bentler, 1999
	Bentler-Bonett Normed Fit Index NFI	1.000	Perfect fit	Tabachnick & Fidell 2021
Non-Centrality-Cased Indices	Comparative Fit Index CFI	1.000	Perfect fit	Tabachnick & Fidell, 2021
	Root Mean Square Error of Approximation RMSEA	.000	Perfect fit	Hu & Bentler, 1999

Table 8. Coefficient Determining the Effect Size of the Model on Research Variables

Component	R ²	R
Diversity	0.478	0.691
Interactive Environment	0.425	0.651
Environmental Safety	0.211	0.459
Creative Environment	0.317	0.563
Collaborative Environment	0.164	0.404
Eventable Environment	0.154	0.392

Table 9. Variance of Variables in the Final Model and Estimation of Operational Errors

Operational error	Component	Estimate	Standard Error	C.R.	P
E1	Creative environment	53.578	6.029	8.887	***
E2	Eventable Environment	32.609	6.346	5.139	***
E3	Diversity	10.646	1.679	6.340	***
E4	Interactive Environment	4.194	0.610	6.871	***
E5	Collaborative Environment	17.032	3.053	5.578	***
E6	Environmental Safety	6.623	1.283	5.163	***
E7	Discoverable Environment	68.134	59.554	1.144	0.253

DISCUSSION

To discuss the findings, we first address the research questions and examine the specific assumptions underlying the study. According to the findings, several strategies have been identified to enhance self-actualization within residential complexes. These strategies include creating spaces that promote mental security and comfort, designing environments conducive to events and user intervention, incorporating nature, fostering creativity, and facilitating diverse activities. Collectively, these strategies contribute to the desirability of spaces and ultimately foster residents' prosperity. The following components affecting self-actualization will be discussed in detail:

A "creative environment" within residential complexes can be facilitated through platforms that

encourage creative activities and events, promoting active participation. Incorporating information-rich environments and providing opportunities for personalization further enhance the conducive learning atmosphere. Burleson (2005) emphasized the significance of learning and creativity in encouraging individuals to achieve self-actualization. Recognizing the role of solitude in creative endeavors, the design includes private spaces that foster focused thinking and contemplation. Kovtun's research (2014) supports this notion, suggesting that solitude helps accumulate energy for creative work by enhancing introspection. Therefore, cultivating creativity is essential for facilitating residents' self-actualization, positioning the "creative environment" as a foundational element in achieving this goal.

The "Eventable environment" component is actualized through the design of meeting halls and multipurpose spaces, which provide platforms for meaningful social events. Outdoor areas are utilized for group exhibitions and lively gatherings, enhancing the overall vibrancy of the complex. The incorporation of open-air amphitheaters and sports facilities further contributes to memorable social events, allowing residents opportunities for self-expression and responsibility. Gharehbaglou et al. (2017) suggest that establishing platforms for events and ceremonies is vital for fulfilling the need for self-actualization within residential complexes. Thus, the opportunities for diverse activities created in these environments form a foundation for residents to achieve self-actualization.

"Diversity" in residential complexes is achieved by offering a variety of spaces, activities, uses, materials, and furniture. Providing individuals with the autonomy to choose from diverse activities enhances satisfaction and promotes active participation. The integration of attractive furniture in open spaces harmonizes with nature, allowing residents to engage in both social and solitary activities. Alaghemand et al. (2019) found that spatial diversity effectively supports individuals in realizing their self-actualization by granting them the freedom to choose. Consequently, designing residential complexes with an emphasis on diversity can facilitate residents' self-actualization.

A "collaborative environment" encourages residents to actively shape and personalize their surroundings. Cooperative parks and multifunctional spaces promote collaboration, while flexible furniture and movable partitions enable individuals to modify the environment according to their preferences. Supporting teamwork through designated spaces and collaborative art surfaces fosters creative expression and a sense of ownership, addressing the need for self-actualization as highlighted by Lang (1994). Therefore, the collaborative environment component, which provides opportunities for individuals to showcase their abilities, serves as a basis for residents to achieve self-actualization.

An "interactive environment" fosters genuine social interactions through thoughtfully designed spaces. Defined privacy areas, conversation rooms, and intersecting pathways encourage residents to connect and share experiences. Social events and shared memories contribute to creating an intimate social environment. Hanley and Abell (2002) emphasized that interaction with others plays a crucial role in self-actualization. Thus, facilitating

deep social interactions in an interactive residential complex environment can significantly support residents in their self-actualization journey.

Integrating the "environmental safety" component in residential complexes involves designing safe, legible, and visible pathways and spaces. Adequate lighting, clear signage, and surveillance of public areas ensure residents feel psychologically secure. Privacy is maintained through design elements such as varied seating arrangements and defined boundaries, enhancing overall safety and comfort. Seyfiyan and Mahmoudi (2007) indicate that achieving self-actualization necessitates a sense of security, privacy, comfort, and peace. Therefore, providing environmental safety and mental comfort is crucial for residents to reach self-actualization.

"Discoverability" as an element encourages residents to explore and interact with their surroundings. Creating intriguing features, such as labyrinthine pathways, stimulates curiosity and engagement. The incorporation of diverse textures, water elements, and environmental art enhances sensory experiences, fostering a discoverable environment that enriches the journey toward self-actualization. Weaver (2010) notes that since self-actualization is an exploratory process, architecture can facilitate this journey by fostering a sense of discovery and encouraging individuals to explore their environment. Pallasmaa (2021) adds that architecture, by engaging all human senses, leads individuals toward greater awareness of the world around them.

In conclusion, the principles of residential complex design significantly impact enhancing residents' levels of self-actualization. By integrating these components into the design process, architects and planners can create environments that support and nurture the self-actualization of their residents.

CONCLUSION

The primary objective of this research was to develop a causal model for the design components of residential complexes, focusing on fulfilling residents' self-actualization needs. Achieving self-actualization is synonymous with reaching an optimal level of mental health; individuals who attain this state experience enhanced mental well-being and creativity. Thus, the concept of self-actualization as a psychological necessity is of paramount importance, necessitating the use of all environmental capabilities to meet human needs and achieve the highest level of self-actualization.

To achieve the primary objective of this research, which was to create a design model of residential complexes based on residents' self-actualization, the study was conducted in three stages: the Delphi method and data mining, user surveys, and correlation analysis. The results from the first stage, which included data mining and the Delphi method, identified the effective dimensions of self-actualization from the perspectives of experts. These dimensions reflect the mental models of architectural experts regarding the topic.

In the second stage, after surveying residents of residential complexes, the design components that support residents' self-actualization were introduced and explained. Subsequently, modeling was conducted to explore the relationships between these components, and the fit and acceptability of the presented model were examined and confirmed. The model, based on meaningful relationships between the design components of residential complexes, provides an accessible framework for addressing the need for self-actualization among residents.

Ultimately, by adhering to the design principles of residential complexes, an improvement in the level of self-actualization among adults living in these environments is anticipated. This improvement can be observed through various aspects, including the functions and activities that emerge within the environment, the meanings and perceptions associated with the space, and the interactions experienced at different levels. Future designs can benefit from incorporating components that promote self-actualization, such as creating spaces that offer mental security and comfort, facilitating events, allowing user intervention and control over the environment, integrating nature, fostering exploration and interaction, and enabling creativity. Designing interactive spaces that encourage engagement among individuals of different age groups and support diverse activities can enhance the utility of these residential environments. This leads to the recognition and expression of one's true self, reflected in the personalized living space. In the pursuit of self-actualization and the maximization of internal capacities, we can expect to see an increase in residents' psychological well-being, heightened creativity, and improved mental health within the community. Enhanced quality of communication and individual life is also anticipated, although these outcomes may take time to manifest, resulting in lasting effects.

It is essential to acknowledge that all research endeavors have limitations. In this study, the first limitation pertains to the research instrument, which relies on self-reporting. Despite efforts to include relevant topics in the questionnaire, some pertinent theoretical and practical aspects may have been overlooked. The second limitation relates to access to experts, which impeded the possibility of conducting in-person interviews and administering questionnaires. The third limitation involved users' and experts' access to the Internet during the survey phase, complicating their ability to complete the electronic questionnaire. To address this, QR codes and paper questionnaires were utilized to facilitate access for residents of the residential complexes.

For future research, it would be beneficial to explore similar methodologies in other urban contexts, such as offices, cultural facilities, and educational environments for children and teenagers. While this study focused on adults living in residential complexes, some findings may be applicable to other age groups. Therefore, future studies should consider including a broader demographic to enhance the generalizability of the results. Additionally, based on the research model and referring to Table 9, it can be observed that the model developed in this study has the potential for expansion from points e1, e2, e3, e4, e5, and e6. There are indirect relationships that facilitate further development of the model from these points. Thus, the model shows potential for expansion at these six points, and further investigations can be conducted on the factors affecting these points, namely creative environment, eventable environment, diversity, interactive environment, collaborative environment, and environmental safety.

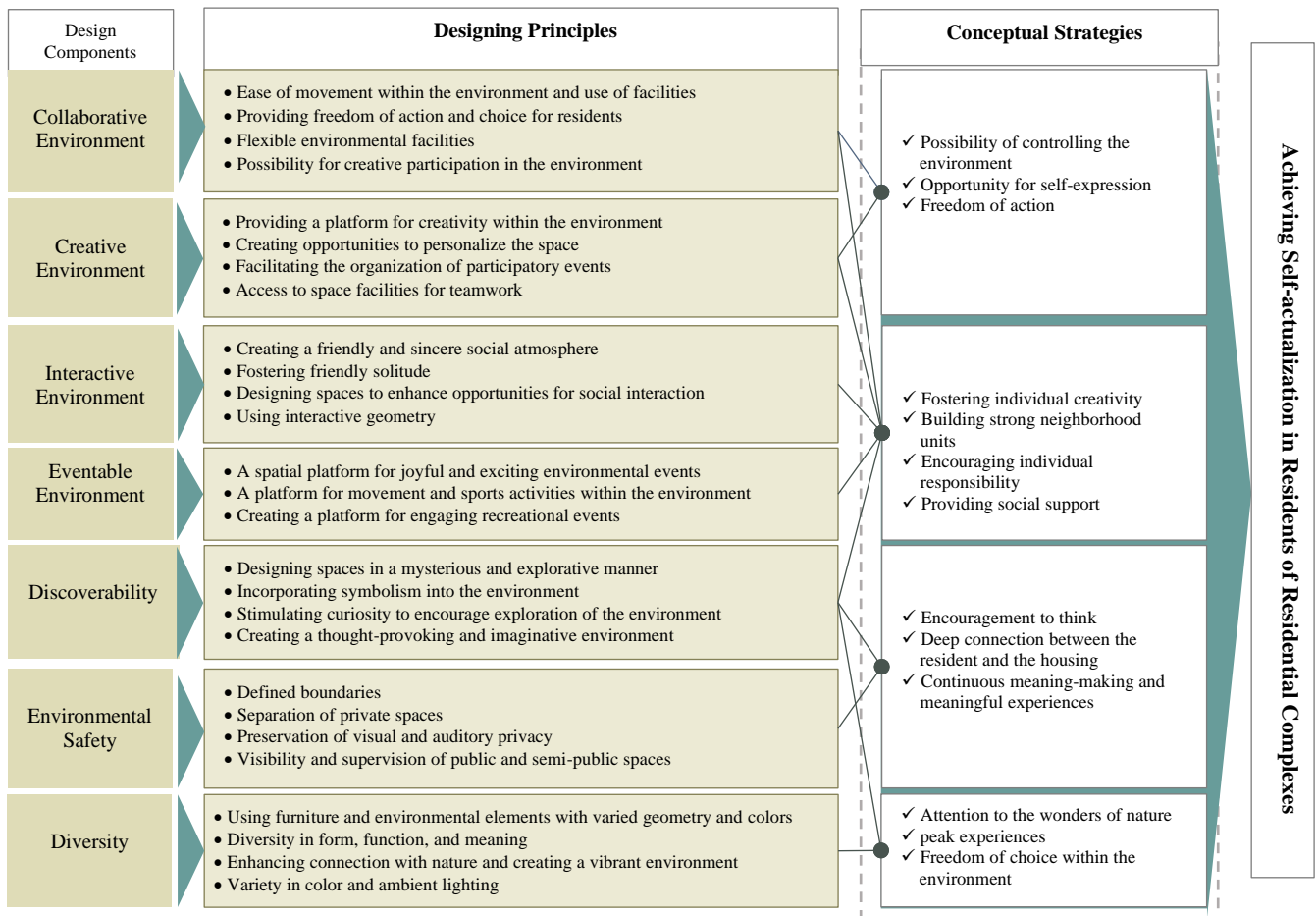


Fig 5. Achieving Self-actualization in Residents of Residential Complexes

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CONFLICTS OF INTERESTS

All authors certify that they have no affiliations with or involvement in any organization or entity with any financial or non-financial interests in the subject matter or the materials discussed in this manuscript.

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