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Development and validation of civic engagement scale

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This study identifies areas of civic engagement measurement that contribute to sustainable social revitalization. Applying the theory of motivation and behavior, we developed and validated a civic engagement scale through a comprehensive literature review and analysis to explore its concept and components. Interviews with five academics and nine field personnel, alongside two Delphi surveys, were conducted to verify the content validity of the civic engagement concepts, components, and preliminary questions. A civic engagement model was then developed to capture cognitive, affective, agentic, and relational behaviors. To ensure contemporary relevance, the scale development process incorporated evolving civic values such as environmental sustainability, cultural participation, and digital engagement. Using results from a preliminary survey ($N = 206$), we established a hypothesized model and validated it through a main survey ($N = 842$). We ensured scientific rigor by assessing the validity and reliability across dimensions. The study yielded a multidimensional framework for interpreting civic engagement, capturing highly engaged agentic and relational behaviors that existing tools may not measure. Additionally, shifts in citizens' values were analyzed to propose new areas of civic engagement activity. Lastly, the validation process confirmed the scale's scientific rigor and demonstrated its reliability for interpretation.

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Introduction

The significance of active citizenship and education as collective social acts—establishing shared objectives and fostering mutual development among individuals and communities—has been repeatedly emphasized (UNESCO, 2022). Social participation is increasingly understood, alongside education, as a form of shared well-being, one that is chosen, achieved, and shared as a common good. It promotes democratic participatory action rooted in inclusion and equity. Civic education and civic engagement provide the knowledge and innovation necessary to create a sustainable, peaceful future grounded in social, economic, and environmental justice. In particular, civic engagement serves as an important first step in establishing a shared vision of public purpose and collectively envisioning the future as a new social contract.

In modern society, the concept of the “citizen” has expanded to include individuals who are informed and engaged members of the communities they are a part of, making rational decisions that take into account both self-interest and the public good. Civic engagement is a multidimensional construct encompassing individuals’ active participation in governance, decision-making, and public affairs to influence policies and democratic processes (Creighton, 2005). While social engagement primarily includes volunteering, community involvement, and social capital formation, civic engagement is explicitly oriented toward participatory democracy and policy-driven actions that shape public governance (Adler and Goggin, 2005; Putnam, 2000). This study conceptualizes civic engagement as a governance-centered participatory phenomenon rather than general community involvement. Trust in societal institutions, civic compliance, and overall life satisfaction are positively associated with individuals assuming responsibility for public affairs and engaging in participatory behavior as active stakeholders in their communities (OECD, 2009). To promote proactive citizenship, practical, hands-on civic education proves more effective than universally standardized approaches in activating civic skills and motivation.

A combination of factors drives civic engagement behaviors aimed at revitalizing communities and strengthening democratic governance. Behavioral research seeks to understand their underlying motivations and steer them toward socially desirable outcomes. To achieve this, social science approaches include legal regulations, economic incentives, educational programs that change attitudes and teach target behaviors, and the use of informal media within the community (Ophuls, 1977; cited in Park, 2001). Civic engagement research primarily draws on resource theory (Acock and Scott, 1980; Verba and Nie, 1987), motivation theory (Downs, 1957; Kim, 2010; Olson, 1989), and behavior theory (Habermas, 1989; Kim, 2019). While resource theory is often used to study civic engagement from a management perspective, it remains more contentious than other frameworks (Shin, 2019). This is because the concept of “resources” overlaps with those of environment and strategy, making it difficult to systematically categorize resources and capabilities and theorize their relationships with other variables.

Therefore, interpreting civic engagement as a multidimensional concept through the resource theory of social context alone is difficult. Instead, motivation and behavior theories serve as primary frameworks for interpreting and measuring participatory behavior from a citizen’s perspective. However, it has been argued that behavioral theory overemphasizes environmental determinants while neglecting internal psychological characteristics (Lee, 2006). Moreover, it does not consider macro-level factors such as cultural background, social status, or economic conditions. On the other hand, motivation theory focuses on the relationship between motivation and behavior by analyzing individuals’ participation resources or attitudinal factors. Rational choice theory,

often used in civic engagement research, suggests that collective social action results from individuals making decisions for various reasons. By focusing on individual determinants, this framework helps predict outcomes and choice patterns while offering insights into the decision-making processes aimed at maximizing individual utility. Consequently, rational choice theory effectively captures the multidimensional nature of civic engagement, which manifests in various phenomena.

Despite its multidimensional nature, research on civic engagement has primarily focused on two frameworks: a unidimensional model examining participation and a two-dimensional model focusing on individual dispositions or perceptions. However, civic engagement—important for strengthening social capital—should be studied from a multidimensional perspective, as participation gaps stem from various factors such as interpersonal relationships, individual beliefs, and the nature of formal and informal participation (Moreno-Jiménez et al., 2013; van den Wijngaard et al., 2015; Waeterloos et al., 2021). In particular, cognition plays a key role in influencing emotions and behavior. Therefore, to observe behavioral changes that reflect psychological changes, civic engagement behavior must be analyzed in both cognitive and affective domains. Moreover, proactive participation across various domains is influenced by network cohesion. As fluid networks become more salient than traditional fixed networks rooted in education, kinship, or shared regional ties, discussing and measuring the networks and relational behaviors individuals form based on personal preferences or choices is necessary.

Civic communities formed to solve public problems or address participants’ needs often become less interconnected as they achieve their objectives (Downs, 1957; Olson, 1989). Ideally, communities should serve as mediating platforms while sustaining and developing democratic social engagement. While existing tools for measuring civic engagement capture social change and provide valuable metrics, they fail to reflect evolving civic awareness, roles, or attitudes. Therefore, to revitalize civic engagement, a new measurement tool is needed to assess citizen attitudes and behaviors from the perspective of fostering civic awareness, such as perceived participation levels and shifts in awareness shaped through experience. Finally, a metrological analysis of existing civic engagement measurement tools revealed that most either lack validity or reliability items or demonstrate low validity and reliability. This aligns with Talò and Mannarini (2015), who found that existing instruments lack a robust theoretical and measurement foundation. This underscores the need for developing more robust civic engagement tools.

In summary, the definition of civic engagement depends on societal, cultural, political, economic, and educational contexts, among others (Frederickson, 1991; Heater, 1999; Kymlicka, 2002). Therefore, its indicators should remain fluid, reflecting the evolving cultural and social trends of a specific country, region, or community. For instance, South Korea lacks a multidimensional measure of adult civic engagement that reflects its social context. Therefore, it is necessary to expand existing categories of civic engagement and incorporate new media and activities that have emerged in the social and cultural milieu. This study aims to develop and validate a civic engagement scale grounded in theories of participation motivation, and behavior. By analyzing the cognitive and emotional changes cultivated through formal and informal activities, social commitment, and the pursuit of change, we seek to understand the multidimensional context of society and the evolution of civic consciousness and behavior. The resulting measurement tool can inform strategies to foster a culture of active citizen participation, establish civic education to redefine citizenship, and develop and implement programs to

revitalize communities. By identifying changes in citizens' perceptions, attitudes, and behaviors, this framework will serve as a basis for activating a culture of civic participation.

Citizen and civic engagement. The concept of citizenship has held significance since humans first began formulating ideas about people, society, and politics. Emerging in ancient societies, the term “citizen” referred to a group of people who were granted the right to deliberate and decide on public matters collectively. Citizens were expected to cultivate learning and manners and engage in the arts, expressing their civic roles and opinions through independent judgment and action based on their knowledge. Plato stated that a virtuous person with a harmonious mind and body is only complete when they possess the qualities of a good citizen, which can be cultivated through education (Han, 2005). While citizenship in ancient societies was limited to a privileged few, it became the genesis of the process toward universalizing civic ideals and rights for all. In summary, a citizen in Western political philosophy is an individual who is both a social being and a resident of a particular region, possessing the qualifications and qualities of a member of a community called human and national (McCowan, 2011).

The modern concept of civic engagement, as practiced by members of a community, traces its origins to free cities (communes) that emerged from the feudal lords in the Middle Ages (Turner and Hamilton, 1994). Civil society is historically rooted in the citizens who shape and lead it, and this concept has evolved. Generally, civil society is defined as a community of individuals living freely and equally as human beings, while citizens are members of the state and market communities. This type of community actively critiques social issues such as human rights violations, social inequality, and dehumanization caused by the maximization of human self-interest, thus striving to create a community that upholds human rights. These efforts have spurred greater public participation, with these active participants recognized as citizens (Cohen and Arato, 1992).

Citizens are expected to be responsible, politically oriented, and actively involved in various decision-making processes (Berlin, 2002; Westheimer and Kahne, 2004a). Citizen and citizenship are multidimensional concepts whose definitions have evolved to emphasize the dynamic relationship between society and its members. Contemporary definitions of citizenship include both public and private aspects. A citizen is typically defined as an individual with an interest in and knowledge of their social community and considers both private and public interests. The ideal citizen is an actor who actively engages in shaping their own life and the community around them, maintains a sustained interest in societal and political matters, fulfills civic duties, and is not content with the status quo of the society or community to which they belong. Instead, they actively seek to exercise democratic freedoms through pluralistic forms of self-organization.

Civic engagement traces its roots to the notion of anguish discussed in Sartre's *Being and Nothingness* (1943). Under the premise that there is no God, the process of consciously detaching oneself from the existing situation and committing oneself to the future as a free human being is seen as the beginning of engagement. If active social participation is considered the first step toward social change, then civic participation should be approached as a process aimed at fostering active participation and change rather than simply being interpreted as participation. In this study, civic engagement is conceptualized as a tool for democratization (Checkoway and Aldana, 2013; Helguera, 2011; Westheimer and Kahne, 2004b) and as a process for strengthening solidarity (Adler and Goggin, 2005) through participation to

improve the conditions of others and to shape the future of a community. Contemporary citizens are active agents who exercise agency over their lives and community destinies, promoting change through participatory action across various sectors of society. Moreover, the scope of civic participation has expanded as society's goals and challenges have diversified. In this context, civic engagement can be defined as an activity that cultivates consciousness and proactive behavior for positive change within societal mechanisms, encompassing social, cultural, political, and economic aspects. Its focus should extend beyond political goals aimed at strengthening democratic societies to include the improvement of the quality of life of both communities and individuals through active participation in everyday life.

Dimensions and areas of civic engagement. Since democracy derives its legitimacy from the active participation of its citizens, its ideals are realized through civic engagement. The scope and content of civic engagement have varied across time and cultures and, therefore, depend on the researcher's perspective and interests (Adler and Goggin, 2005; Gibson, 2000; Putnam, 2000). If declining civic engagement is a pressing concern in democracies, it is imperative to clarify what aspects are declining and what societal needs must be addressed (Berger, 2009). First, we examine the types of civic engagement by focusing on involvement levels. In addition to demographic factors, individual psychological traits such as interest and commitment significantly influence civic engagement. Involvement begins with voluntary choices shaped by personal attitudes, beliefs, and values, prompting individuals to act as active and engaged citizens (Abramson, 1983). Achieving high levels of civic engagement necessitates examining the stages of participation.

Sherry Arnstein's (1969) Ladder of Citizen Participation model emphasizes government mandates, commitment to civic engagement, and power sharing between the communities and governments. It categorizes citizen participation into—non-participation, tokenism, and citizen power—structured as an eight-step ladder from micromanagement to self-governance. Arnstein argues that citizen self-governance is the most effective way to address challenges faced by residents, highlight its infinite potential, and provide clear criteria for distinguishing between genuine and superficial participation by delineating the stages of citizen participation. In a similar vein, Joseph F. Zimmerman (1986) categorized civic participation into active and passive based on the participant's degree of voluntariness. The Organization for Economic Cooperation and Development (OECD) proposes three types of participation—informing, consulting, and actively participating (Gramberger, 2001). Moreover, the 2021 Open Government: Citizen Engagement Toolkit by the United Nations Economic and Social Commission for Western Asia (UNESCWA) identifies the stages of participation as participation, collaboration, and full engagement (UNESCWA, 2021).

The positive effects of civic engagement are realized when citizens actively shape decisions through collaborative processes. The literature on civic engagement reveals a gap between active and passive participants, rooted in the fact that activities require significant investments of time, money, and energy—resources that individuals must possess or be able to mobilize (McCarthy and Zald, 2001; Verba et al., 1995). Consequently, to foster citizen-led participation and strengthen engagement between individuals and societies, governments must cultivate an environment where they are perceived as trustworthy partners, and citizens should develop proactive communication and cooperative attitudes. Civic engagement manifests itself in proactive participatory behaviors, reflecting the extent of the

participant's selective will and interest. The form and level of participation depend on the social system and its relationship with citizens. Active participation strengthens interpersonal relationships and influences decision-making processes and outcomes. At its core, civic participation revolves around who, what, when, and how (Lee and Kim, 2018). Since the effectiveness of participation hinges on the direction of communication between the state and citizens as well as the level of participation, states seeking to promote civic engagement should prioritize two-way communication and establish horizontal relationships with citizens rather than unilaterally providing information. Furthermore, societies and countries need to build trust and create an open environment where citizens can participate in all decision-making processes to encourage proactive participation.

From an individual participation perspective, we examine civic engagement through the lens of activity domains, considering that individuals with high levels of participatory citizenship are more likely to hold post-materialistic values (Inglehart and Welzel, 2005). Participants perceive, interpret, and make judgments using the information provided and decide what actions to take to induce social change. Although citizenship norms and post-materialistic values evolve constantly as a result of a country's internal and external factors, empirical research focusing on this change remains limited. The post-materialism index reflects the esthetic, intellectual, belonging, and self-esteem needs associated with social and personal self-actualization (Inglehart, 1990). It includes action-oriented goals such as protecting esthetics and the environment, achieving social change through ideas, promoting freedom of expression, building a more humane society, increasing workplace and community participation and empowerment, and having a voice in national decisions. In its *How's Life?* 2020 report, the OECD states that deteriorating natural and economic capital, social decline, and emotional despair have negatively impacted the quality of life since 2010. To balance quality of life across generations, it is important to move beyond simply maximizing present quality of life and instead work toward improving living conditions for a sustainable future society. Efforts to address social problems through natural, social, human, and economic capital—which are public goods—must precede sustainable societies and well-being. Ware and Dunphy (2020) propose a framework for measuring cultural engagement in Australian communities, identifying environment, society, civic governance, economy, and culture as emerging areas of engagement crucial for future preparedness. To build sustainable societies, it is essential to consider environmental, social, governance, cultural, and educational domains within participatory activities across society alongside political participation.

Equally important is civic education, a key tool in the global response to various challenges (UNESCO, 2022). Addressing societal challenges such as war, environmental disasters, population migration, climate change, and digitalization requires the active participation of citizens equipped with critical thinking skills. Education that nurtures engaged citizens who understand their democratic freedoms and rights and care about common issues (Sim, 2017) induces civic change and participation. Sociocultural change, stemming from socioeconomic modernization, manifests in a generational shift from materialistic to dematerialistic values (Inglehart, 1990). As modernization and globalization diversify societies, they redefine the relationship between citizens and governments and unveil new areas of civic engagement. To reflect the multidimensional nature of civic engagement and examine variations across participation levels, this study proposes five key areas of civic engagement for fostering a sustainable future society: politics, environment and sustainability, culture and the arts, social media, and civic education.

Systematic review of the tools used to measure civic engagement. For this study, we analyzed existing literature on civic engagement measurement to establish a theoretical foundation for scale development. Following the *Handbook for Systematic Reviews* (Higgins et al, 2019) and the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines, we analyzed the content and characteristics of existing civic engagement instruments. To identify articles relevant to civic engagement measurement tool development, we used University A's integrated search database, aggregating sources such as Web of Science, Education Source, Business Source Complete, Science Direct, SCOPUS®, DBPIA, and the Directory of Open Access Journals. The search strategy and review process were developed through iterative discussions between the lead researcher and a senior faculty member. Keywords were organized in three conceptual tiers: (1) citizen identity (e.g., "civic," "citizen," "community"), (2) participatory action (e.g., "engagement," "involvement," "movement"), and (3) measurement terminology (e.g., "scale," "instrument," "survey"). This multi-step approach enhanced both the conceptual precision and methodological rigor of the literature screening.

We focused on social capital research from 1994 onward, as this period marked a pivotal point in the rise of scholarly interest in civic engagement in democratic societies. The search was conducted from January 17, 2023, to February 6, 2023. From the 1027 titles retrieved, we reviewed 827 based on pre-defined inclusion and exclusion criteria, excluding 200 duplicates.

Articles not focused on measurement tool development or those featuring scales designed to assess social engagement following recovery from behavioral health conditions were excluded. However, a small number of instruments originally designed for community health evaluation were retained if their constructs overlapped with civic engagement domains such as participation, advocacy, or social influence.

After reviewing titles and keywords, 728 articles were excluded, leaving 99 for abstract review. Of these, 76 were excluded for focusing on domains such as service learning, social capital, program evaluation, and factors influencing civic engagement, which were identified as measurement domains within citizenship and civic engagement. Expert review further excluded 11 articles for being irrelevant to the civic engagement or for lacking mention of measurement tools, resulting in 12 articles for the final review.

These instruments have been added to Table 1 and systematically compared based on measurement constructs, cultural context, psychometric structure, and their relevance to contemporary civic engagement. This comparative synthesis allowed us to identify conceptual gaps in existing measures and to situate our scale within an evolving framework of civic engagement assessment.

Among the reviewed instruments, the Youth Involvement Inventory (Pancer et al., 2007) and the Civic Development Scale (Wray-Lake et al., 2020) offer notable, developmentally grounded frameworks for assessing civic engagement among youth. Both instruments were validated through longitudinal analyses, capturing civic trajectories during adolescence and early adulthood. Despite their contributions, these tools remain primarily oriented toward formal political behaviors and appear to place less emphasis on affective, relational, or culturally embedded forms of engagement. While these dimensions are not explicitly excluded, they are either underrepresented or indirectly addressed through behavioral proxies. As summarized in Table 1, the present study builds on and extends these frameworks by developing a culturally grounded, psychologically integrated scale suitable for diverse adult populations.

Table 1 A comparative analysis of civic engagement measurement scales: validity, limitations, and theoretical contributions.						
No.	Tool name and source	Measuring area [No. of items] (Cronbach's alpha)	Audience (People)	Likert	Limitations	Contributions of this study
1	Civic Participation Scale (CPS); Weber et al. (2004)	• Civic participation [6] ($\alpha = 0.84$) • Self-efficacy towards service [5] ($\alpha = 0.80$)	18-25 year olds (851)	5	Primarily focuses on self-efficacy rather than observed civic behaviors, limiting its ability to assess actual engagement. Developed within an educational context, making its applicability to broader civic participation settings less certain.	Expands the scope by integrating both perceived self-efficacy and demonstrated civic behaviors across diverse participation contexts. Enhances external validity by validating the scale for a general adult population beyond educational settings.
2	Youth Involvement Inventory (YII); Pancer et al. (2007)	• Political activities [7] ($\alpha = 0.78/0.73$) • Community activities [8] ($\alpha = 0.71/0.58$) • Passive involvements [5] ($\alpha = 0.58/0.63$) • Helping activities [10] ($\alpha = 0.82/0.81$) • Social responsibility [6] ($\alpha = 0.79$) • Global Competence [9]	17-19 years (880, 333)	5	Developed for Canadian adolescents; limited generalizability; passive subscale showed low reliability; lacks affective and relational dimensions.	Introduced a robust multidimensional framework; validated via identity, social responsibility, and family function; confirmed stability over time.
3	Global Citizenship Scale (GCS); Morais and Ogden (2011)	-Self-awareness [3] ($\alpha = 0.69$) -Intercultural communication [3] ($\alpha = 0.76$) -Global knowledge [3] ($\alpha = 0.67$) • Global Civic Engagement [15] -Involvement in civic organizations [8] ($\alpha = 0.92$) -Political voice [4] ($\alpha = 0.86$) -Global civic activism [3] ($\alpha = 0.74$)	18-25 years old (382)	5	Emphasizes global awareness and social responsibility but lacks integration with localized civic participation. Focuses mainly on attitudes with limited measurement of actual participatory behaviors.	Bridges global and local civic engagement by incorporating behavioral indicators alongside attitudinal and cognitive dimensions. Expands applicability beyond international service-learning contexts to measure civic participation in everyday community settings.
4	Civic Engagement Scale (CES); Doolittle and Faul (2013)	• Attitude [8] ($a = 0.91$) • behavior [6] ($a = 0.85$)	Young adults (513)	7	Lack of clear differentiation between formal, informal, relational, and agentic engagement.	A comprehensive classification of civic engagement types is necessary. A multidimensional framework incorporating formal/informal, cognitive, affective, agentic, and relational engagement is required.

Table 1 (continued)						
No.	Tool name and source	Measuring area [No. of items] (Cronbach's alpha)	Audience (People)	Likert	Limitations	Contributions of this study
5	Community and Socio-Political Participation Scale (SCAP); Moreno-Jiménez et al. (2013)	• Community participation [3] ($\alpha = 0.83$) • Socio-political participation [5] ($\alpha = 0.82$)	Adults (756)	10	Reliance solely on self-reported data without integration of observed civic behaviors.	Combining self-reported measures with behavioral tracking is essential to enhance measurement validity and minimize response biases.
6	Conditions for Social Engagement Questionnaire (CSEQ); van den Wijngaard et al. (2015)	• Political interest and social analysis [8] ($\alpha = 0.73$) • Valuing applicability [5] ($\alpha = 0.61$) • Self-efficacy [7] ($\alpha = 0.57$)	Young adults (354)	7	Insufficient assessment of psychological motivations (e.g., self-efficacy) that drive civic engagement.	Psychological factors influencing civic engagement, such as self-efficacy and intrinsic motivation, must be measured to understand the determinants of sustained participation.
7	Participatory Behaviors Scale (PBS); Talb and Mannarini (2015)	• Disengagement [7] ($\alpha = 0.80$) • Civil participation [8] ($\alpha = 0.72$) • Formal political participation [13] ($\alpha = 0.78$) • Activism [6] ($\alpha = 0.71$)	Adults (566)	5	Measurement tools predominantly developed for specific cultural or regional contexts (e.g., rural Ghana), limiting generalizability.	Cross-cultural validation is necessary to ensure applicability across diverse sociopolitical environments, enabling broader generalization of findings.
8	Civic engagement (CE); Veeh et al. (2019)	- Total [15] ($\alpha = 0.69$) • Civic mindedness [7] • Civic acts [8]	18-25 years old (1274)	5	Overemphasis on digital engagement with insufficient assessment of offline civic activities.	A balanced measurement approach that captures both online and offline civic engagement is required to provide a more holistic assessment.
9	Civic Development Scales (CDS); Wray-Lake et al. (2020)	• Community service [1] • Political interest [1] • Electoral participation [3] • Political voice [3] (Cronbach's α not reported; factor structure validated by EFA)	18-30 years old (12,557)	Mixed(4,5)	U.S.-based design limits cross-cultural applicability; civic engagement is narrowly defined and partly measured with single items.	Validated a multidimensional civic engagement model and revealed intersectional developmental patterns using longitudinal data.
10	Community development participation scale (CDPS); Gyan (2021)	• Attitude and interest [8] ($\alpha = 0.73$) • Active participation [9] ($\alpha = 0.79$)	Adult females (210)	5	Inability to track longitudinal changes in civic participation patterns.	Longitudinal assessment frameworks should be incorporated to analyze evolving trends in civic engagement over time.

Table 1 (continued)						
No.	Tool name and source	Measuring area [No. of items] (Cronbach's alpha)	Audience (People)	Likert	Limitations	Contributions of this study
11	Social Media Political Participation scale (SMPP); Waeterloos et al. (2021)	• Latent engagement [5] ($\alpha = 0.89$) • Counter engagement [4] ($\alpha = 0.91$) • Follower engagement [5] ($\alpha = 0.80$) • Expressive engagement [7] ($\alpha = 0.82$)	Young adults (595)	5	Lack of age-specific differentiation, failing to capture civic engagement patterns among emerging adults and younger populations.	Measurement instruments need to reflect generational differences, ensuring the inclusion of emerging adults and younger cohorts in civic engagement research.
12	Social Participation Scale (SPS); Qiang et al. (2022)	• Prosocial tendencies and material values [14] ($\alpha = 0.91$)	Adults (328)	6	Methodological constraints reducing external validity and limiting generalizability.	Enhancing external validity through mixed-method validation, including surveys, behavioral observations, and experimental approaches, is necessary to improve measurement reliability.

Notably, Youth Involvement Inventory (Pancer et al., 2007) emphasizes behavioral frequency across domains such as political and community activities, without systematically incorporating constructs related to internal motivations or emotional bonds with civic life. Its application remains largely restricted to adolescent populations in Canadian contexts. Similarly, Wray-Lake et al. conceptualize civic engagement through four behavioral dimensions—community service, political interest, electoral participation, and political voice—but do not include direct measures of emotional or relational constructs, such as sense of belonging, communal empathy, or intersubjective civic identity.

While the reviewed instruments—including those developed in North America—provide valuable insights into civic engagement, their direct applicability to the Korean context remains limited. This is due to key sociocultural and institutional differences that shape civic behavior. For instance, instruments such as the Youth Involvement Inventory (Pancer et al., 2007) or the Civic Development Scale (Wray-Lake et al., 2020) were developed in liberal democratic societies with deeply embedded traditions of civic voluntarism, community organizing, and formalized youth participation structures. In contrast, Korea's civic infrastructure reflects a unique trajectory shaped by compressed modernization, hierarchical state–citizen relationships, and the relatively recent institutionalization of civil society following democratization. Consequently, while these North American tools offer conceptual grounding, they fail to adequately capture Korea-specific modes of informal engagement, relational collectivism, or issue-based mobilization shaped by sociopolitical memory and rapid digitalization. Thus, this study addresses the need to develop a culturally adaptive, context-sensitive civic engagement framework suited for Korean adults across diverse social strata.

In addition to these developmental instruments, the broader review of existing civic engagement scales identified several recurring conceptual and structural tendencies across disciplines. Civic engagement is widely recognized as a multifaceted construct, yet its operationalization varies considerably depending on disciplinary perspectives and research objectives. Many tools emphasize political participation—such as voting, protests, and advocacy—over a broader spectrum of participatory behaviors (Adler and Goggin, 2005; Gibson, 2000; Oser, 2017; Pontes et al., 2017). This tendency persists despite growing consensus that civic engagement encompasses a wide range of activities, including social, economic, and community-based forms of participation (Jolley et al., 2008).

While recent scales have sought to capture the multidimensional nature of civic engagement, limitations remain in their scope and applicability. The Global Citizenship Scale (Moraes and Ogden, 2011), for instance, effectively measures global engagement but lacks integration with localized civic participation. Similarly, the Civic Participation Scale (Weber et al., 2004) emphasizes self-efficacy rather than actual engagement behaviors, restricting its predictive validity. Other instruments, such as the Social Media Political Participation Scale (SMPP) (Waeterloos et al., 2021), focus on digital engagement but do not account for offline civic behaviors, while the Community and Socio-Political Participation Scale (SCAP) (Moreno-Jiménez et al., 2013) is limited in generalizability due to its focus on specific demographic groups.

To refine the conceptualization of civic engagement, this study excludes measurement tools designed for behavioral health rehabilitation, as they focus on individual recovery rather than broader civic participation. Instead, civic engagement should be reconceptualized as a multidimensional construct encompassing cognitive, affective, agentic, and relational dimensions. This framework enables a more comprehensive understanding of civic

Table 2 Research procedure and main contents.				
Research procedures			Highlights	
Development of measurement tools	Modeling	Explore antecedents	Literature survey and review of prior research, qualitative analysis of interviews (N = 14).	
		Model settings	Conceptualization and derivation of constructs, content validation (N = 15).	
		Develop and review preliminary questions	Developing preliminary questions, setting up item response forms.	
Validate measurement models and scales		Refine and finalize scales	Item analysis, validity (EFA) analysis, reliability analysis (N = 206).	
			Item analysis, validity (recruitment validity, convergent validity, congruent validity, predictive validity, cross validity) and reliability (N = 842).	

participation by integrating individual motivations with collective behaviors in diverse sociopolitical contexts.

The review also identified emerging forms of civic engagement, including digital activism (Zait and Andrei, 2019), value-based purchasing (Mehmood et al., 2022), and community-driven sustainability initiatives (Remr, 2023), alongside conventional activities such as volunteering and political participation. These emerging domains reflect the shifting landscape of civic engagement, where participatory behaviors increasingly occur through digital platforms, consumer decision-making, and local environmental initiatives (Morais and Ogden, 2011; Weber et al., 2004).

However, research remains skewed toward younger populations, particularly individuals under 25, resulting in a gap in understanding civic engagement among middle-aged and older adults. Furthermore, measurement tools predominantly rely on Likert scales, typically ranging from 5 to 10 points, yet many fail to justify their scale structures or ensure comparability across studies.

Notably, among the reviewed studies, only Doolittle and Faul (2013) employed a rigorous and systematic scale development process, adhering to key psychometric standards such as content and construct validity. Other studies fail to meet essential psychometric criteria, including content validity, construct validity, and internal consistency. For instance, while the Global Citizenship Scale (Morais and Ogden, 2011) incorporates multiple subdomains, it lacks robust validation of its behavioral components. Similarly, the Social Media Political Participation Scale (Waeterloos et al., 2021) focuses on political behaviors but does not account for nonpolitical civic engagement.

Despite the development of various civic engagement measurement tools, many instruments lack empirical validation, restricting their reliability and generalizability. These trends collectively indicate a disproportionate emphasis on political participation, often at the expense of informal, relational, and digital modes of civic action. Moreover, prior scales fail to integrate self-reported data with observed behavioral outcomes, diminishing their predictive validity.

A critical gap identified in this review is the absence of longitudinal validation, making it difficult to assess how civic engagement evolves. Additionally, few instruments incorporate cross-cultural adaptations, restricting their applicability across diverse populations. Addressing these limitations is crucial for improving measurement accuracy and ensuring civic engagement assessments remain relevant within dynamic sociopolitical environments.

Furthermore, existing measurement tools often fail to account for the psychological mechanisms underlying civic engagement, particularly self-efficacy, which plays a crucial role in sustaining participation. The Civic Engagement Scale (Droege and Ferrari, 2012) contributes to this discussion by incorporating self-efficacy as a predictor of civic behaviors. However, its applicability remains limited as it primarily focuses on structured, service-

oriented activities rather than capturing diverse and informal engagement behaviors.

This underscores the need for a more comprehensive measurement framework that integrates psychological, behavioral, and contextual factors of civic engagement. Such an approach would enable a more nuanced understanding of how individuals translate motivation into action within various sociopolitical and cultural settings.

Methods

Research procedures. To systematically develop the civic engagement scale, we followed the scale development procedure outlined by Netemeyer et al. (2003). First, we created a conceptual model to define the construct to be measured and to outline the scale’s structure and content. Second, in the preliminary item development and review stage, we created measurement items that reflected the conceptual model of civic engagement. After determining the response format and the number of items, we formulated the preliminary items. We then verified the content validity (qualitative and quantitative) through a Delphi survey. In the scale refinement and finalization stage, we tested the validity and reliability of the preliminary items through a preliminary study, making refinements by adding and removing items. Lastly, we confirmed the scale’s reliability and validity. Table 2 details the procedures and methods used for scale development.

Research subjects. To refine the conceptual framework of civic engagement and ensure the content validity of the measurement tool, we conducted semi-structured interviews with five academic experts specializing in civic participation and nine field practitioners with extensive experience (M = 13.5 years of experience) in activism. The interview protocol focused on key dimensions of civic engagement, distinctions from social engagement, and emerging forms of participation in contemporary society. A thematic analysis of interview responses informed the modification of preliminary measurement items, particularly in distinguishing agentic and relational dimensions of engagement.

To refine the conceptual framework and validate the scale items, we conducted two rounds of Delphi surveys with 15 experts (M = 18 years of experience). The Delphi process assessed item clarity, relevance, and theoretical coherence, ensuring that the civic engagement scale accurately reflects contemporary participatory behaviors.

Finally, we surveyed Korean adults aged 19 and older who met the eligibility criteria. According to Statistics Korea, as of March 2023, the population was estimated at 51,410,000, with 43,245,603 adults aged 19 and over (Resident Registration Statistics, 2023). Convenience sampling, a non-probability sampling method, was used to select participants for this study. Survey responses were collected online for approximately one week, from April 17 to April 21, 2023, yielding 1048 responses after excluding dishonest and duplicate responses. Participants were divided into two

stages: refine and finalize scales ($N = 206$) and validate measurement models and scales ($N = 842$). Gender distribution was nearly balanced in both stages, with the first stage comprising 104 males (50.5%) and 102 females (49.5%), while the second stage included 429 males (51.0%) and 413 females (49.0%).

Measurement tools. We developed 37 instrument items across four components, measured on a 6-point scale.

In developing the measurement items, particular attention was paid to the evolving values that contemporary citizens prioritize in civic life. Beyond traditional notions of political engagement, recent shifts indicate growing emphasis on environmental sustainability, social responsibility, cultural participation, and digital inclusion. These value transformations were deliberately incorporated into the item construction process to ensure conceptual alignment with the lived experiences and normative orientations of modern civic actors. This approach is theoretically grounded in post-materialist value theory (Inglehart, 1990) and contemporary well-being frameworks (OECD, 2020), both of which underscore the diversification of civic concerns in late-modern societies.

The 6-point scale was chosen based on studies suggesting that midpoint responses may introduce bias, as they can imply falsity when the question conveys urgency (Jang and Cho, 2017; Johns, 2005; Oh, 1992; Tourangeau et al., 2007). Next, we used the Civic Engagement Scale (CES) developed by Doolittle and Faul (2013) to validate the instrument's face validity. For predictive validity, we selected the Satisfaction With Life Scale (SWLS) developed by Arrindell et al. (1999) based on the expected positive association between civic engagement and life satisfaction.

Data analysis. Preliminary items were validated through a Delphi and response survey, followed by a review of the developed instrument using factor analysis. The appropriateness of components and items was assessed using the content validity ratio (CVR, 5 points) and narrative responses. A CVR of 0.490 or less for 15 experts and 0.510 or less for 14 experts was considered for revision and addition (Lawshe, 1975). Factor analysis was performed using SPSS 25.0 and AMOS 25.0 to determine the factor structure. In addition, we employed the maximum likelihood method and direct oblimin, a quadratic rotation method. From 1,048 responses (excluding non-responses and duplicates), we selected 206 via quota sampling for exploratory factor analysis (EFA) and used 842 for confirmatory factor analysis (CFA). The factor loadings of ≥ 0.7 were considered desirable, and ≤ 0.5 inadequate (Devellis, 2021; Woo, 2022). Commonality, representing the proportion of variance explained by the extracted factors, was required to be at least 0.4 (Hair et al., 2010).

Results

Define civic engagement and develop a measurement model.

Civic engagement is a dynamic and multidimensional construct that plays a critical role in democratic governance and social cohesion. Positive and productive experiences, such as civic engagement resulting in social change, can enhance self-esteem (Park, 2015), foster a sense of satisfaction, and reinforce attachment to both one's community and place of residence. Participation in such activities equips individuals with valuable information, skills, and networks, motivating further engagement (Helguera, 2011; Lee, 2022). As a lived experience, civic engagement fosters the development of competencies essential for critical reflection, personal growth, and active participation, encompassing cognitive and affective attitudes, agentic behaviors, communication, and collaboration with stakeholders.

Previous research by Soucie et al. (2018) highlighted the developmental interplay between community involvement and generative concern in emerging adults through a longitudinal lens. Their work affirmed that civic participation supports identity formation and social responsibility over time. However, their focus remained at the conceptual level, without differentiating among types or qualities of civic engagement. In contrast, the present study structurally disaggregates civic engagement into four distinct domains—cognitive, affective, agentic, and relational behaviors—thus allowing for a more refined understanding of the psychological and behavioral mechanisms underlying civic development. This framework not only aligns with developmental insights from generativity theory but also operationalizes participation into measurable dimensions relevant for adult populations across life stages.

To refine the conceptual framework of civic engagement and ensure the validity of the proposed measurement model, semi-structured interviews were conducted with five academic experts and nine field practitioners actively engaged in civic participation. The interviewees represented diverse sectors, including education, social activism, media, and policy-making, ensuring a holistic perspective on contemporary civic engagement practices. The interviews explored the conceptual underpinnings of civic engagement, key participatory behaviors, and the evolving nature of engagement in digital and globalized contexts.

Key findings from expert interviews. A thematic analysis of the interview data identified four key insights that informed the refinement of the conceptual framework:

Civic engagement should be conceptualized as a process-oriented behavior rather than a static trait, emphasizing individuals' agency in democratic governance and social transformation.

Relational engagement emerged as a distinct domain of civic participation, reflecting the increasing importance of social networks, digital interactions, and community-based collaboration.

A clear distinction between civic engagement and social engagement was necessary, with experts highlighting that civic engagement is directly tied to governance and policy influence, while social engagement predominantly pertains to community service and voluntary initiatives.

Emerging dimensions of civic engagement include digital activism, environmental sustainability, and cultural participation, necessitating an expansion of traditional measurement domains to capture contemporary participatory behaviors.

These insights guided the refinement of the initial civic engagement model, leading to the identification of four core dimensions: cognitive, affective, agentic behavior, and relational behavior.

To further validate and refine the conceptual framework, two rounds of Delphi surveys were conducted with 15 experts specializing in civic participation and democratic engagement. The Delphi method was employed to assess the clarity, theoretical relevance, and applicability of the measurement model, ensuring its robustness across diverse sociocultural contexts.

First Delphi round (Conceptual refinement and content validity assessment). In the first round, experts assessed the appropriateness of the conceptual model and its subdomains. As shown in Table 3, several dimensions required modification. The conceptual definition of civic engagement was refined to emphasize its governance-oriented nature, and relational behaviors were introduced as a distinct subdomain based on expert recommendations.

Table 3 Summary of first Delphi survey results.					
Dimension	Mean	Standard deviation (SD)	Median	CVR	Review outcome
Civic engagement	3.333	1.075	3.000	0.400	Retained with conceptual modifications
Cognitive	3.800	0.980	3.000	0.667	Retained with conceptual modifications
Affective	3.467	1.087	4.000	0.400	Retained with conceptual modifications
behavior	3.200	1.327	3.000	0.467	Revised and restructured into Agentic behavior; Relational behavior newly introduced

Second Delphi round (Technical refinement and scale finalization). In the second round, experts evaluated each item’s clarity, coherence, and applicability. Items were assessed based on validity criteria, including CVR (≤ 0.510), convergence (≥ 0.500), agreement (≤ 0.750), stability (≥ 0.800), and interquartile range ($IQR \geq 1.000$), as shown in Table 4. Items meeting at least one of these conditions were either revised or eliminated.

Following this validation process, we finalized the measurement tool, establishing a structured set of items that comprehensively capture civic engagement dimensions. The scale comprised 37 items across four factors: cognitive (9 items), affective (9 items), agentic behavior (10 items), and relational behavior (9 items).

Unlike prior civic engagement frameworks, which primarily distinguish between formal and informal participation (e.g., Doolittle and Faul, 2013; Talò and Mannarini, 2015), this study introduces a more nuanced conceptualization that differentiates agentic and relational behaviors. Agentic behavior is defined as governance-oriented individual actions, encompassing policy advocacy, activism, and self-directed civic participation in both offline and digital contexts. This aligns with Fiske’s (2018) theoretical distinction between agency and communion, emphasizing competence-driven action in civic engagement.

Conversely, relational behavior is reconceptualized as participatory agency, emphasizing collective decision-making, social networks, and community-driven collaboration. Unlike traditional definitions that equate relational behavior with social bonding and communal trust (Ivens, 2004), this study aligns with Burkitt’s (2016) notion of relational agency, where individuals exercise agency within interconnected social structures to achieve shared civic goals. Building on this conceptual distinction, we operationalized relational behavior through items assessing interpersonal trust, participation in collaborative civic initiatives, and sustained engagement in community networks. These items were reviewed and refined through expert consensus in the Delphi panel. This perspective highlights the increasing role of grassroots organizing, civic partnerships, and network-based collaboration in contemporary civic engagement. Importantly, both agentic and relational behaviors manifest across digital and offline spaces, reflecting the evolving nature of participatory democracy in networked societies.

These factors and sub-items were developed through a comprehensive literature review of civic engagement measurement instruments and refined based on the expert-panel Delphi survey results. The revisions included restructuring items to capture both process- and outcome-oriented behaviors, simplifying terminology to enhance clarity across diverse respondent groups, and providing explicit examples to delineate the scope of “community” and “civic activities”. The final definitions of civic participation and its subdomains are presented in Table 5.

Exploratory factor analysis results. To refine the civic engagement measurement model and scale and confirm the structural factors, perceptions, and measurement modalities of civic engagement, we conducted a preliminary survey. We used the

response data from this survey to test the validity and reliability of the factor structure and scale. The preliminary survey included 206 respondents, consisting of 104 males and 102 females. We collected data on the participants’ demographic characteristics, including age, gender, education level, marital status, and occupation. The age distribution was as follows: 37 in their 20s, 41 in their 30s, 53 in their 40s, 47 in their 50s, and 28 in their 60s and older. The respondents were from diverse regions, with 102 from the Seoul metropolitan area, 53 from regional and special autonomous cities, and 51 from special provinces and territories. In terms of education, 120 were college graduates, 38 were high-school graduates, 30 were college students, 14 held master’s degrees, and 4 had doctoral degrees. We analyzed the data using descriptive statistics and correlation analysis.

The results showed a mean score ranging from 3.019 to 5.160, with a standard deviation between 0.896 and 1.376 per item, exceeding the adequacy criterion of 0.150 (Meir and Gati, 1981). The skewness values ranged from -1.082 to 0.101 , and the kurtosis values ranged from -0.946 to 1.620 , indicating normal distribution (± 2 or less) (Bandalos and Finney, 2010). The item “Cognitive 2” was removed because its correlation with the other items (0.282) was less than 0.300 (Kline, 2016). The overall reliability was strong, with a Cronbach’s alpha value of 0.964. Removing the item, which affected reliability, resulted in a slight increase of 0.001. Although this increase was not significant, the item was removed in accordance with the criterion that items with correlations of 0.300 or less would be removed.

We conducted the factor analysis using direct oblimin rotation and the maximum likelihood method, expecting correlation within the extracted factors. The Kaiser–Meyer–Olkin (KMO) index was calculated to determine sample adequacy, yielding a value of 0.947, exceeding the adequacy criterion of 0.700. Commonality values ranged from 0.374 to 0.883, and items with values below 0.400 were removed. Four factors were determined through screening and parallel analysis: Agentic behavior 1 (0.375), Cognitive 1 (0.378), and Cognitive 3 (0.391). The model explained 68.615% of the cumulative variance. To ensure the relevance of the factor items, we used a criterion of ± 0.5 or higher for substantively important items, while ± 0.5 or lower indicated items to be reconsidered (Devellis, 2021). Cross-loadings and variance differences were examined to determine the final deletion of items. The analysis of the four-factor model confirmed distinct theoretical substructures of Civic Engagement: Cognitive, Affective, Agentic behavior, and Relational behavior. Factor 1 had high factor loadings for items related to agentic behaviors, Factor 2 for affective behaviors, Factor 3 for cognitive behaviors, and Factor 4 for relational behaviors. Of the 37 items in the preliminary survey, one was excluded from the descriptive statistics analysis. Additionally, we excluded eight items during the exploratory factor analysis and conducted a second exploratory factor analysis with the remaining 28 items. The results are presented in Table 6.

Confirmatory factor analysis results. The confirmatory factor analysis (CFA) survey included 842 respondents with diverse

Table 4 Results of the second Delphi survey analysis.

Measurement Factor	Mean	Std Dev	Convergence	Agreement	Stability	CVR	IOQ	Decision
Cognitive1	4.143	1.027	0.500	0.750	0.248	0.714	1.000	Modify
Cognitive2	3.929	0.829	0.875	0.563	0.211	0.286	1.750	Delete
Cognitive3	3.143	0.949	0.875	0.417	0.302	−0.286	1.750	Delete
Cognitive4	3.357	1.447	1.250	0.286	0.431	0.000	2.500	Delete
Cognitive5	3.214	1.369	0.875	0.563	0.426	0.286	1.750	Delete
Cognitive6	3.429	1.222	1.000	0.500	0.357	0.143	2.000	Delete
Cognitive7	4.357	0.929	0.500	0.800	0.213	0.714	1.000	Modify
Cognitive8	3.429	1.089	0.875	0.563	0.318	0.143	1.750	Delete
Cognitive9	3.286	1.267	1.000	0.429	0.386	0.000	2.000	Delete
Cognitive10	3.643	1.336	0.875	0.563	0.367	0.286	1.750	Delete
Cognitive11	3.643	1.393	0.750	0.625	0.382	0.429	1.500	Delete
Cognitive12	3.857	0.949	0.000	1.000	0.246	0.571	0.000	Modify
Cognitive13	4.360	0.497	0.500	0.750	0.114	1.000	1.000	Modify
Cognitive14	3.857	1.099	0.375	0.813	0.285	0.571	0.750	Modify
Cognitive15	3.286	1.267	1.000	0.500	0.386	0.143	2.000	Delete
Cognitive16	2.929	1.141	1.000	0.333	0.390	−0.286	2.000	Delete
Cognitive17	3.429	0.938	0.750	0.625	0.273	0.429	1.500	Delete
Cognitive18	4.000	0.679	0.000	1.000	0.170	0.857	0.000	Keep
Cognitive19	4.000	0.784	0.000	1.000	0.196	0.714	0.000	Modify
Cognitive20	3.929	0.917	0.000	1.000	0.233	0.714	0.000	Modify
Cognitive21	4.000	0.392	0.000	1.000	0.098	0.857	0.000	Modify
Cognitive22	3.071	1.269	1.000	0.429	0.413	0.000	2.000	Delete
Affective1	4.286	0.726	0.500	0.750	0.169	0.714	1.000	Keep
Affective2	4.429	0.646	0.500	0.778	0.146	0.857	1.000	Modify
Affective3	4.143	0.864	0.500	0.750	0.209	0.714	1.000	Modify
Affective4	3.643	1.277	0.375	0.813	0.351	0.429	0.750	Delete
Affective5	3.786	0.802	0.375	0.813	0.212	0.429	0.750	Delete
Affective6	3.286	1.326	1.000	0.429	0.404	0.000	2.000	Delete
Affective7	3.643	0.842	0.500	0.750	0.231	0.143	1.000	Delete
Affective8	3.143	0.864	0.875	0.417	0.275	−0.143	1.750	Delete
Affective9	4.500	0.519	0.500	0.778	0.115	1.000	1.000	Modify
Affective10	3.571	1.399	0.875	0.563	0.392	0.286	1.750	Delete
Affective11	4.286	0.726	0.500	0.750	0.169	0.714	1.000	Modify
Affective12	4.643	0.497	0.500	0.800	0.107	1.000	1.000	Modify
Affective13	4.357	0.842	0.500	0.778	0.193	0.857	1.000	Modify
Affective14	4.500	0.519	0.500	0.778	0.115	1.000	1.000	Modify
Affective15	4.071	0.829	0.875	0.563	0.204	0.429	1.750	Delete
Affective16	3.929	0.730	0.375	0.813	0.186	0.429	0.750	Delete
Affective17	4.286	0.611	0.500	0.750	0.143	0.857	1.000	Modify
Affective18	3.214	1.251	1.000	0.429	0.389	0.000	2.000	Delete
Affective19	4.429	0.646	0.500	0.778	0.146	0.857	1.000	Keep
Affective20	3.500	1.019	0.500	0.750	0.291	0.143	1.000	Delete
Affective21	3.357	1.336	0.875	0.563	0.398	0.286	1.750	Delete
Affective22	4.286	0.611	0.500	0.750	0.143	0.857	1.000	Modify
Agentic behavior1	4.143	0.770	0.500	0.750	0.186	0.571	1.000	Modify
Agentic behavior2	3.643	0.929	0.500	0.750	0.255	0.286	1.000	Delete
Agentic behavior3	4.286	0.914	0.500	0.778	0.213	0.714	1.000	Modify
Agentic behavior4	4.071	0.829	0.375	0.813	0.204	0.714	0.750	Modify
Agentic behavior5	4.357	0.929	0.500	0.800	0.213	0.714	1.000	Keep
Agentic behavior6	3.286	1.437	0.875	0.563	0.437	0.286	1.750	Delete
Agentic behavior7	3.143	1.351	1.000	0.429	0.430	0.000	2.000	Delete
Agentic behavior8	3.857	1.167	0.875	0.563	0.303	0.429	1.750	Delete
Agentic behavior9	4.071	0.997	0.500	0.750	0.245	0.714	1.000	Modify
Agentic behavior10	4.500	0.519	0.500	0.778	0.115	1.000	1.000	Keep
Agentic behavior11	3.857	0.864	0.375	0.813	0.224	0.429	0.750	Delete
Agentic behavior12	4.214	0.802	0.500	0.750	0.220	0.571	1.000	Modify
Agentic behavior13	3.643	1.216	0.875	0.563	0.334	0.143	1.750	Delete
Agentic behavior14	3.857	1.099	0.000	1.000	0.285	0.714	0.000	Modify
Agentic behavior15	3.500	1.160	0.500	0.750	0.331	0.286	1.000	Delete
Agentic behavior16	3.714	1.204	0.875	0.563	0.324	0.286	1.750	Delete
Agentic behavior17	4.000	1.038	0.375	0.813	0.259	0.714	0.750	Modify
Agentic behavior18	4.143	1.027	0.500	0.750	0.248	0.857	1.000	Keep
Agentic behavior19	4.000	1.038	0.375	0.813	0.259	0.714	0.750	Modify
Agentic behavior20	3.643	1.393	0.750	0.625	0.382	0.429	1.500	Delete
Agentic behavior21	3.500	1.454	0.375	0.813	0.416	0.429	0.750	Delete
Agentic behavior22	3.571	1.158	0.875	0.563	0.324	0.286	1.750	Delete

Table 4 (continued)

Measurement Factor	Mean	Std Dev	Convergence	Agreement	Stability	CVR	IOQ	Decision
Agentic behavior23	3.786	1.251	1.000	0.500	0.331	0.286	2.000	Delete
Relational behavior1	4.500	0.519	0.500	0.778	0.115	1.000	1.000	Keep
Relational behavior2	4.500	0.519	0.500	0.778	0.115	1.000	1.000	Keep
Relational behavior3	3.214	1.369	0.875	0.563	0.426	0.286	1.750	Delete
Relational behavior4	3.714	1.139	0.875	0.563	0.307	0.286	1.750	Delete
Relational behavior5	4.071	0.829	0.375	0.813	0.204	0.714	0.750	Modify
Relational behavior6	3.857	1.099	1.000	0.500	0.285	0.286	2.000	Delete
Relational behavior7	4.143	0.864	0.500	0.750	0.209	0.714	1.000	Keep
Relational behavior8	4.214	0.699	0.500	0.750	0.166	0.714	1.000	Keep
Relational behavior9	3.571	1.016	0.500	0.750	0.285	0.286	1.000	Delete
Relational behavior10	4.286	0.611	0.500	0.750	0.143	0.857	1.000	Modify
Relational behavior11	3.643	1.008	0.375	0.813	0.277	0.429	0.750	Delete
Relational behavior12	4.286	0.825	0.500	0.750	0.193	0.857	1.000	Keep
Relational behavior13	4.071	0.829	0.375	0.813	0.204	0.714	0.750	Keep
Relational behavior14	4.214	0.893	0.500	0.750	0.212	0.714	1.000	Modify
Relational behavior15	3.429	1.284	0.875	0.563	0.374	0.143	1.750	Delete
Relational behavior16	3.643	1.393	1.375	0.313	0.382	0.286	2.750	Delete
Relational behavior17	3.429	1.222	1.000	0.500	0.357	0.143	2.000	Delete
Relational behavior18	3.929	1.072	0.875	0.563	0.273	0.429	1.750	Delete
Relational behavior19	3.786	1.122	0.750	0.625	0.296	0.429	1.500	Delete
Relational behavior20	3.571	1.284	0.875	0.563	0.359	0.143	1.750	Delete
Relational behavior21	3.500	1.286	0.875	0.563	0.367	0.286	1.750	Delete

Table 5 Civic engagement definitions and subfields.

Configure	Define
Civic engagement	Cognitive, affective, agentic behavioral, and relational behavioral tendencies to actively contribute to and participate in the maintenance and development of one's geographic, cultural, and social community.
Subzones	
Cognitive	The mental energy an individual invests to actively contribute to and participate in the performance of a community.
Affective	The emotional intensity of the individual's willingness to invest in actively contributing to and participating in community performance.
Agentic behavior	Behaviors that positively influence an individual's willingness to contribute to and participate in community performance.
Relational behavior	Social interactions that occur between members of society or groups of people to actively contribute to and participate in community performance.

demographic backgrounds. Key participant characteristics, including gender, age, geographic region, educational attainment, marital status, and occupation, are summarized in Table 7.

The broad demographic distribution of the sample enhances the study's external validity, ensuring that the scale applies to a wide range of populations. The diverse representation across age groups, educational levels, and regional backgrounds supports the generalizability of the findings, confirming that the developed measurement tool is robust across different sociocultural contexts. We conducted confirmatory factor analysis using AMOS 25.0, and the model demonstrated an adequate fit, as shown in Table 8.

The root mean square error of approximation (RMSEA) is considered good if it is 0.050 or less, acceptable if 0.080 or less, moderate if less than 0.100, and poor if greater than 0.100 (Woo, 2022). The Tucker-Lewis index (TLI) ranges from 0 to 1, with values above 0.90 indicating a good fit (Bentler, 1990; Tucker and Lewis, 1973). The four-factor model of civic engagement was confirmed to explain cognitive, affective, agentic, and relational behaviors (Fig. 1). Based on the fit indices of each model, we can conclude that the proposed four-factor model meets the criteria of an acceptable model. The relative fit indices, including the comparative fit index (CFI) and TLI, as well as the absolute fit index, RMSEA, all showed acceptable values, confirming the goodness of the model's fit.

Validation of convergence results

Verification of factor loadings and significance. To verify the convergent validity of civic engagement, we examined the factor loadings and significance of each measurement variable across subdomains. We ensured the language was clear, concise, and objective, with a logical flow of information and causal connections. Additionally, we avoided biased language and maintained grammatical correctness. The standardized factor loadings for cognition ranged from 0.719 to 0.797, for emotion from 0.749 to 0.816, for agentic behavior from 0.658 to 0.938, and for relational behavior from 0.749 to 0.839. Most items scored above 0.700, indicating high convergent validity. All pathways were substantial at the $p < 0.001$ level, except for Agentic Behavior, which scored 0.658, exceeding the minimum threshold of 0.500. Overall, the civic engagement scale's convergent validity was confirmed adequate through factor loadings and significance tests.

Validation of average variance extracted. Convergent validity is considered adequate when the variance explained by the latent variable exceeds the measurement error. Typically, the average variance extracted (AVE) measures the proportion of common variance within the latent variables, with values greater than 0.500 and less than 0.950 indicating good convergent validity (Woo, 2022). In the present analysis, the AVE

Table 6 Secondary results of preliminary exploratory factor analysis.

Factor	F3	F2	F1	F4	α
Factor 1. Cognitive					0.877
1 I use information from a variety of online and offline channels to identify issues and relevant actors. (e.g., newspapers, television, newsletters, social media, YouTube, websites, etc.)	0.768	−0.093	−0.014	0.093	
2 I gather and analyze information about social structures or issues that need to be changed and select actions I can take.	0.747	0.073	0.144	−0.039	
3 I am generally good at judging or evaluating the rightness or wrongness of the vast amount of information about society that exists online and offline.	0.702	0.017	0.015	0.028	
4 I have a sustained interest in learning about different cultures and perspectives of other communities. (e.g., social, cultural, environmental, etc.)	0.684	0.062	0.066	0.054	
5 I can understand and explain the different causes of social problems. (e.g., food shortages, global warming, refugees, etc.)	0.663	−0.070	0.158	−0.038	
6 I recognize that being interested in and well informed about what is happening in society is necessary for the development of a healthy community.	0.623	0.266	−0.270	0.105	
Factor 2. Affective					0.888
1 I am proud of the community to which I belong.	−0.025	0.797	0.170	−0.016	
2 I feel a sense of unity with the members of my community.	−0.017	0.739	0.058	0.170	
3 I find the process of solving social problems through my efforts fun and enjoyable.	0.350	0.623	0.137	0.011	
4 I believe that the growth or development of my community is good for me.	0.244	0.611	−0.163	0.167	
Factor 3. Agentic behavior					0.963
1 I participate in online and offline civic education programs to increase my motivation and commitment to engage in civic activities.	−0.044	−0.029	0.916	0.059	
2 I actively participate in online and offline campaigns or organizations that address discrimination faced by marginalized groups. (e.g., learning communities, village communities, organizations that run experiential and educational programs)	−0.020	−0.028	0.890	0.095	
3 I belong to an NGO, association, or social organization and participate in various activities. (e.g., arts and culture, environment, human rights, education, sports, etc.)	−0.015	0.081	0.889	−0.076	
4 I participate in events or activities that promote social change, whether or not I receive material benefits. (e.g., campaigns, seminars, workshops, debates, learning communities, village communities, etc.)	−0.019	0.100	0.868	0.032	
5 I actively participate in social issues or campaigns for the betterment of my community, both offline and online.	0.085	−0.056	0.853	0.055	
6 I visit art galleries, museums, cultural sites, etc., to understand the tangible and intangible heritage of my community and regularly participate in experiential and educational programs.	0.030	−0.026	0.733	0.164	
7 I take the initiative to participate in political activities for the betterment of my community beyond voting. (e.g., rallies, political party support, citizen juries, public hearings, advisory committees, consensus meetings, etc.).	0.096	0.089	0.728	0.045	
8 I actively participate in giving or volunteering for the betterment of my community.	0.106	0.067	0.708	0.115	
9 I prioritize the purchase of products produced or distributed by fair trade or social enterprises to contribute to community development.	0.210	0.018	0.583	0.083	
Factor 4. Relational behavior					0.940
1 I respect the views and feelings of the various stakeholders I encounter in my community involvement activities (e.g., employees, operators, experts, government officials, etc.).	0.064	−0.030	−0.068	0.794	
2 I recognize the importance of balancing my life and work with my community.	0.026	0.205	−0.124	0.734	
3 I work with others to make a positive difference in my community.	−0.044	0.150	0.044	0.731	
4 I consider and decide on public benefits for the betterment of my community.	0.089	−0.098	0.171	0.725	
5 I participate in activities that protect the rights of community members.	0.101	−0.181	0.188	0.722	
6 I reach out when I see someone in my community who is struggling.	0.028	−0.019	0.144	0.707	
7 I talk with people around me, both online and offline, about the development and future of my community.	0.060	−0.044	0.187	0.688	
8 I actively participate as a positive facilitator to achieve common interests or goals.	−0.046	0.281	0.183	0.569	
9 I trust and actively help members of the community with whom I work.	−0.077	0.381	0.088	0.558	
Eigenvalue	13.719	3.543	2.047	1.138	
Explanatory variables (%)	48.998	12.654	7.309	4.065	
Cumulative variables (%)	48.998	61.652	68.961	73.026	

values for cognitive, affective, agentic, and relational behaviors ranged from 0.561 to 0.697, indicating good convergent validity.

Validation of concept reliability. As the final step in assessing convergent validity, we assessed construct reliability. A value of 0.700 or higher indicates acceptable convergent validity (Woo, 2022). The concept reliability of each variable ranged from 0.866 to 0.953, indicating excellent convergent validity across all constructs.

Concurrent validity results. To test the construct validity, we examined its relationship with the civic engagement scale identified in Doolittle and Faul's (2013) systematic literature review. The overall constructs of both the scales showed a strong correlation ($r = 0.865$, $p = 2.495 \times 10^{-144}$). The subscales also demonstrated strong correlations: cognitive ($r = 0.510$ – 0.591 , $p = 3.861 \times 10^{-76}$), affective ($r = 0.500$ – 0.612 , $p = 4.419 \times 10^{-49}$), agentic behavior ($r = 0.627$ – 0.820 , $p = 4.035 \times 10^{-52}$), and relational behavior ($r = 0.755$ – 0.801 , $p = 3.414 \times 10^{-103}$). These findings confirm that the civic engagement scale developed in this

study has strong face validity, as evidenced by its high correlation with the CES by Doolittle and Faul (2013).

Predictive validity results. To assess the predictive validity of civic engagement, we examined its relationship with life satisfaction using the Satisfaction With Life Scale (SWLS). The results showed a statistically significant positive correlation ($r = 0.542$, $p = 7.278 \times 10^{-160}$) between civic engagement and life satisfaction. Analysis between civic engagement sub-variables and life satisfaction also showed statistically substantial ($p < 0.001$) positive correlations ($r = 0.387\text{--}0.476$). Based on these results, we conducted a path analysis using structural equation modeling to check predictability. The analysis confirmed that civic engagement has a statistically significant positive effect on life satisfaction ($b = 1.049$, $\beta = 0.579$, $p = 2.683 \times 10^{-45}$). The model demonstrated a good fit ($\chi^2(26) = 197.877$, $TLI = 0.951$, $CFI = 0.965$, $RMSEA = 0.089$, standardized root mean square residual [SRMR] = 0.044). Overall, these results indicate that higher levels of civic engagement are associated with greater life satisfaction. Thus, it can be concluded that civic engagement has strong predictive validity.

Cross-validation results. To check cross-validity, we assessed measurement invariance through form and metric invariance. First, for form invariance, we assessed the fit of the baseline model, which allowed correlations among all latent variables and freely estimated their measurements. The model demonstrated

satisfactory fit ($\chi^2(688, N = 421) = 2204.512$, $CFI = 0.921$, $TLI = 0.914$, $RMSEA = 0.051$, $SRMR = 0.054$). For metric invariance, we compared the metric invariant model to the baseline model, constraining factor loadings on each latent variable to be equal. The comparison revealed a difference in χ^2 degrees of freedom (df) of 24, with a $\Delta\chi^2$ of 15.389 (Model 2–Model 1: $2219.901 - 2204.512$). The baseline and the metric invariant models did not show a substantial difference, as the degrees of freedom (df) value of 24 was less than the threshold of 0.05, with an χ^2 value of 36.415. The metric invariant model also showed an acceptable fit ($CFI = 0.922$, $TLI = 0.917$, $RMSEA = 0.050$, $SRMR = 0.054$). Overall, form and metric invariance testing established measurement invariance. The civic engagement measurement model developed in this study was cross-validated, as we found that the same results were replicated using a different sample.

Conclusion and discussion

This study aimed to develop and validate a multidimensional scale of civic engagement grounded in motivational and behavioral theories. While prior models have largely emphasized formal, individualistic, and political dimensions of engagement—

Table 7 Demographic characteristics of main survey participants.			
Category	Subgroup	n	Percentage
Gender	Male	429	51.0%
	Female	413	49.0%
Age group	20–29 years	153	18.2%
	30–39 years	156	18.5%
	40–49 years	197	23.4%
	50–59 years	225	26.7%
	60 years and above	111	13.2%
Geographic region	Seoul capital area	483	57.4%
	Major cities and special administrative cities	209	24.8%
	Special provinces and regions	150	17.8%
Educational level	High school or below	164	19.5%
	Associate degree (2–3 years)	130	15.4%
	Bachelor's degree (4 years)	457	54.3%
	Master's degree	74	8.8%
Marital status	Doctoral degree	17	2.0%
	Single	306	36.3%
	Married (including remarried)	504	59.9%
	Divorced/Separated	32	3.8%
Occupation	Salaried worker	503	59.7%
	Self-employed/Freelancer	102	12.1%
	Professional	32	3.8%
	Student	51	6.1%
	Homemaker	104	12.4%
	Others (Unemployed, Retired, Job seekers, Public officials)	50	5.9%

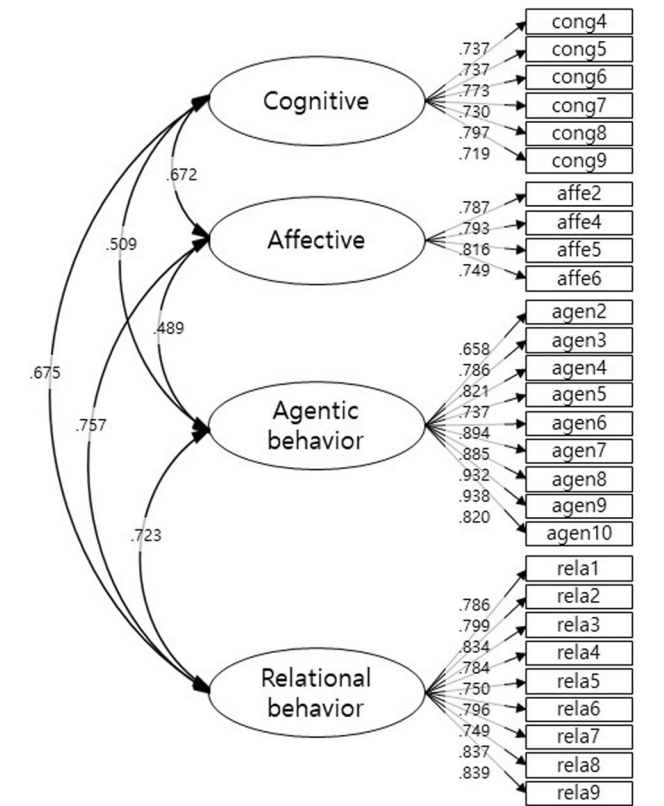


Fig. 1 Factor structure of the civic engagement scale. The validated four-factor model captures four key dimensions: cognitive, affective, agentic behavior, and relational behavior.

Table 8 Results of confirmatory factor analysis of the civic engagement scale.							
Model	χ^2	df	p	CFI	TLI	RMSEA	SRMR
4-Factor model	1768.015	344	8.39×10^{-190}	0.926	0.919	0.070	0.052
Baseline value			$p > 0.05$	≥ 0.90	≥ 0.90	≤ 0.10	≤ 0.08

particularly in North American contexts (e.g., Pancer et al., 2007; Wray-Lake et al., 2020)—this study responds by incorporating relational, affective, and culturally situated forms of participation relevant to the Korean sociopolitical context.

Recent research has shown that affective and relational dimensions of civic engagement can significantly impact psychosocial outcomes such as loneliness, identity development, and community bonding (Soucie et al., 2025). These dimensions remain underrepresented in existing tools, which limits their ability to capture the full scope of civic participation across cultural contexts. The present scale addresses this gap by capturing cognitive, affective, agentic, and relational behaviors, thereby providing a more comprehensive and culturally grounded framework for assessing civic engagement in contemporary society.

First, we recognized the limitations of models using simple dimensions that focus on individual dispositions or perceptions (Doolittle and Faul, 2013) and incorporated multidimensional factors for more in-depth analysis. Importantly, the study maintains objectivity and avoids subjective evaluations. Communities organized around a common purpose undergo social change through interaction and engagement with participants and stakeholders, realizing their impact and fostering both internal and external growth (Talò and Mannarini, 2015). This study contributes to the understanding of civic engagement by elaborating on its dimensions to include cognitive, affective, agentic behavior, and relational behavior.

Importantly, the scale reflects changing civic values in modern society. Participation now includes domains such as environmental sustainability, cultural involvement, and digital activism—areas beyond what traditional measures often capture. The resulting framework recognizes civic engagement as a dynamic process of behavioral change and reflection, positioning individuals as proactive agents of societal transformation. Currently, no tool in Korea captures this level of multidimensionality across the adult population. The scale developed in this study fills this gap by offering a multifaceted structure to interpret diverse expressions and outcomes of civic participation.

Secondly, the study analyzed shifts in citizen values and identified new areas of civic participation, including politics, civic education, environment and sustainability, culture and arts, and social media. These areas facilitate individual self-realization and broader social development. This study also proposes a model to interpret the results of participants' measurements based on their positive and negative civic participation experiences, as well as their active and passive behaviors. Notably, political, institutional, and structural factors must be considered alongside individual factors when explaining civic participation (Rimmerman, 1997). Enabling conditions for participation are shaped by psycho-behavioral factors, individual capacities, and institutional and environmental conditions, with participation in one form often leading to further participatory activities (Kim, 2010). In an era of increasing democratic experiments using digital technologies, with the Internet fostering new forms of postmodern governance, growing citizen participation in politics, and transitioning from dutiful to engaged citizenship, this study's civic engagement model provides a foundation for enhancing participation and citizenship both online and offline.

Third, we propose a framework for interpreting civic engagement from a multidimensional perspective. The questions were designed to emphasize psychological and educational dimensions in practical contexts. These questions reflect cultural, social, and digital literacy; the ability to use shared knowledge; partnerships serving as mediators and facilitators; and trust, which is becoming increasingly salient in contemporary civic engagement. Efforts toward a sustainable future society are driven by education that cultivates civic action. Education, as a collective social act, sets

goals and empowers individuals and communities to progress synergistically (UNESCO, 2022). To discern the processes of acquiring, understanding, interpreting, and evaluating shared knowledge in both online and offline environments, we seek to measure interest, concern, and belief related to civic activities. Existing scales do not adequately capture these aspects. While existing scales include measures of interest, concern, and belief, they are often limited to interest in politics or social issues. Therefore, to measure the immersive experience, we developed nuanced questions to differentiate.

Civic engagement is a dynamic and continuously evolving activity (Moreno-Jiménez et al., 2013), with the inclination to express viewpoints extending into non-institutionalized domains (Inglehart and Welzel, 2005). In the agentic behavior domain, citizenship is evaluated through a wide range of activities that measure individual effort and change. This evaluation is performed from various perspectives, including politics, civic education, environmental sustainability, culture and arts, and social media. Civic engagement is closely linked to social interaction and trust between individuals and groups (Putnam, 1995, 2000). The correlation between the community environments, interpersonal or communal interactions, and different forms of civic engagement, such as social, political, cultural, and human capital, has been well established (Coleman, 1988). To assess civic behavior in terms of human capital accumulation, our questionnaire measured altruistic behavior, care, and trust as distinct domains of community life. This approach helps identify key factors that have been overlooked in existing measures.

The agentic behavior domain received relatively lower scores than other domains, particularly in items assessing participation in civic education and activities within NGOs or associations. These low scores may reflect a broader lack of institutionalized civic engagement and societal trust, despite favorable democratic conditions (OECD, 2009). While North American instruments such as Pancer et al. (2007) and Wray-Lake et al. (2020) emphasize formal and political acts, our scale extends this understanding by capturing culturally embedded, collective, and relational civic behaviors more reflective of Korean society.

To address this, participatory communities in non-formal education should foster an attitude of embracing diverse opinions and perspectives, cultivate a horizontal environment conducive to respectful dialog, and enhance the ability to analyze information and use technology to achieve collective goals. A lifelong learning approach has significant implications for developing proactive civic education and engagement programs.

However, according to the National Institute for Lifelong Education (2022), satisfaction and participation levels in civic education remain relatively low. A participatory culture characterized by ownership and active involvement has yet to take root, and limited demand from participants has resulted in a lack of practical, hands-on programs.

In this context, a civic engagement model that considers both personal and systemic factors influencing civic behavior can be applied to longitudinal analysis. Given the scale's factorial stability and theoretical clarity, it can be used to track civic engagement trajectories across life stages and sociopolitical transitions. Such analyses may reveal how passive individuals become active participants—or conversely, how active citizens disengage. These insights can guide resource allocation, training program design, performance evaluation, and policy development to enhance civic participation in meaningful and sustainable ways.

Fourth, the validation process employed in this study demonstrates that developed civic engagement measures are reliable and interpretable. While existing civic engagement instruments often lack scientific rigor, with a few exceptions, this study systematically developed a civic engagement scale by

adhering to Netemeyer et al. (2003) scale development procedure. To ensure scientific rigor, we verified the validity and reliability across various dimensions, including content validity, convergent validity, discriminant validity, predictive validity, and reliability (concept reliability, Cronbach's alpha), as well as cross-validity. The validation results confirm that this study's scale can effectively measure the relevant areas and factors of civic engagement and that the results can be reliably interpreted.

The study has several limitations and suggestions for future research avenues. First, follow-up research is warranted to refine this study's measurement tool by incorporating new participation media and tools as societies transform, the evolving roles of citizens, and participants' capabilities. Participation is inherently dynamic, constantly evolving in response to changing social, economic, cultural, and technological contexts. Consequently, creating a taxonomy resistant to social change is infeasible, and therefore, ongoing research is essential to remain current with policies that countries pursue and the changing social benefits citizens experience over time.

Additionally, some items were removed as part of the incremental reduction of questions, limiting the reflection of all the originally set measurement factors. During the feasibility analysis, it is possible that significant items identified through expert consultation (Delphi survey) and exploratory factor analysis in the preliminary survey were eliminated. Additionally, the developed civic engagement measurement tool targets individuals aged 19 and above. However, the survey was conducted online, and the data from individuals in their 70s and 80s who may be less familiar with digital devices is underrepresented. Therefore, further research should be carried out using this and other measurement tools. This should involve broadening the survey methodology, refining the sample, and comparing results across different groups.

Follow-up studies should also be conducted using alternative methods to compensate for the subjective interpretations of self-report measures. Achieving a comprehensive measure of civic engagement requires taking into account additional indices or indicators in conjunction with the developed scale. In particular, to address the shortcomings of self-reporting, further research should combine various measurement methods, such as separating response sources and measurement environments or modifying the questionnaire at the data collection stage (Park et al., 2007). Additionally, future research should consider triangulating data using observational studies, behavioral data, or longitudinal tracking to overcome the limitations of self-reported data. Future studies could also triangulate self-reported survey data with behavioral indicators (e.g., participation records, social media traces) or observational methods to enhance construct validity and capture real-world civic behavior more comprehensively. Incorporating these methods would enable a more refined analysis of various aspects of civic engagement and provide more objective data beyond respondents' subjective interpretations.

Data availability

No datasets were generated or analyzed during the current study.

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Author contributions

Conceptualization, JP and AJH; methodology, JP; software, JP; validation, JP and AJH; formal analysis, JP and AJH; investigation, JP; re-sources, AJH; data curation, JP; writing—original draft preparation, JP; writing—review and editing, AJH; visualization, JP;

supervision, AJH; project administration, AJH; funding acquisition, AJH. Both authors have read and agreed to the published version of the manuscript.

Competing interests

The authors declare no competing interests.

Ethical approval

The research protocol was formally reviewed and approved on February 18, 2023, by the Academic Research Committee of the College of Education at Chung-Ang University. The review involved a comprehensive evaluation of the study's objectives, methodology, ethical safeguards, and data collection procedures. Based on this assessment, the committee determined that the study met the exemption criteria for IRB review under South Korean regulations. The study was conducted in accordance with the Declaration of Helsinki and all applicable national legislation. According to the Bioethics and Safety Act (Act No. 20327, partially amended on February 20, 2024) and its Enforcement Rule of Bioethics and Safety Act (Ordinance of the Ministry of Health, Welfare and Family No. 1048, partially amended on August 16, 2024) in South Korea, research may be exempt from formal IRB review if it involves anonymous participants, does not collect personally identifiable information (PII) or sensitive data, and poses minimal risk to participants. Specifically, Article 15(2) of the Act and Article 13(1)(2) of the Enforcement Rule state that IRB review is not required for studies that:

- involve *face-to-face or interactive methods* such as surveys or behavioral observations,
- target *non-specified participants*, and
- do not collect or record *sensitive personal information*, as defined in Article 23 of the Personal Information Protection Act.

This study employed an anonymous online survey, included non-vulnerable adult participants, and collected no identifiable or sensitive data. It therefore met the exemption criteria under both national law and institutional policy. In accordance with these regulations, the Academic Research Committee concluded that this study was exempt from IRB review. No exemption number was assigned, and the institution does not issue exemption letters for studies that meet these criteria.

On June 16, 2023, the Academic Research Committee reconfirmed the study's exempt status as part of a routine administrative procedure. This confirmation did not involve any modifications to the original protocol and did not constitute a new ethics review.

Informed consent

All participants were adults aged 19 or older and were recruited through an anonymous online survey. Prior to participation, they were presented with an online consent form outlining the purpose of the study, the voluntary nature of participation, data anonymity, and their right to withdraw at any time without penalty. Participants indicated their informed consent by proceeding with the survey after reading this information. The survey was conducted from April 17 to April 21, 2023. In accordance with the Bioethics and Safety Act and its Enforcement Rule of Bioethics and Safety Act, written consent was not required for anonymous, minimal-risk survey studies that do not collect personally identifiable or sensitive information.

Additional information

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