

Adaptive Behavior across Adolescence and Early Adulthood: Psychological Vulnerability, Addictive Tendencies, and Hikikomori during Educational Transitions

Roman Id. Aizman^{1,2*}, Alexey D. Gerashev¹, Irina Ig. Novikova²

¹Department of Human Anatomy, Physiology, and Safety of Life, Novosibirsk State Pedagogical University, Novosibirsk, Russia

²Department of Hygienic Research, Novosibirsk Scientific-Research Institute of Hygiene, Novosibirsk, Russia

Email: *aizman.roman@yandex.ru

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Abstract

Background: Adolescence and early adulthood are characterized by repeated developmental and educational transitions that require continuous adaptation to changing social and academic demands. Interests and preferred activities may initially support self-expression and emotional regulation; however, under conditions of psychological vulnerability, some behavioral patterns may acquire maladaptive or addictive features. The relationship between changes in addictive tendencies and the development of social withdrawal remains insufficiently understood. **Objective:** This study examined age- and education-related differences in psychological characteristics, addictive behavior patterns, and hikikomori risk across successive educational stages and assessed whether these differences may reflect a transformation of adaptive and maladaptive behavioral strategies. **Methods:** A cross-sectional study included 269 students aged 14 - 22 years representing six educational groups: Grade 8 and Grade 10 school students, first- and fourth-year college students, and first- and fourth-year university students. Hikikomori tendencies were assessed using the 25-item Hikikomori Questionnaire (HQ-25). Nervous tension, self-esteem, anxiety, and predisposition to different forms of addictive behavior were evaluated using standardized psychological assessment methods. Differences across educational stages and levels of hikikomori expression were analyzed. **Results:** Pronounced differences in psychological characteristics and addictive behavior patterns were observed both between educational levels and between students at the beginning and completion of the same educational stage. Increased hikikomori expression was associated with greater psychological vulnerability, including changes in nervous tension, anxiety, and self-esteem. The relationship

between hikikomori expression and addictive tendencies was non-linear. Across the six educational groups, the cumulative number of detected addictive tendency occurrences was 8 among students without pronounced hikikomori tendencies, increased to 29 in the hikikomori risk group, and decreased to 19 among students with high hikikomori indicators. The greatest diversity of addictive tendencies was therefore observed at the intermediate risk stage rather than among students with the most pronounced social withdrawal. **Conclusion:** The findings suggest that changes in behavioral interests and addictive tendencies during adolescence and early adulthood may reflect a functional reorganization of adaptive strategies associated with educational and developmental transitions. The hikikomori risk stage may be characterized by diversification of compensatory or avoidance-oriented behaviors, whereas pronounced social withdrawal may be associated with narrowing of the behavioral repertoire and increasing dominance of avoidance behavior. Because of the cross-sectional design, this interpretation should be regarded as a conceptual hypothesis requiring longitudinal verification.

Keywords

Adolescence, Early Adulthood, Adaptive Behavior, Educational Transitions, Addictive Tendencies, Hikikomori, Social Withdrawal, Psychological Vulnerability

1. Introduction

Adolescence and early adulthood are periods of profound biological, psychological, and social transformation. During these developmental stages, young people face continually changing demands related to education, interpersonal relationships, increasing independence, self-identification, and preparation for future professional and social roles. Successful transition through these stages requires continuous adaptation to new environmental conditions and the development of behavioral strategies that help individuals maintain psychological stability and effectively interact with the surrounding social environment (Branje et al., 2021).

An important role in this process may be played by interests, hobbies, and preferred forms of individual and social activity. During adolescence, engagement in various activities contributes to self-expression, emotional regulation, communication, and the formation of personal identity (Freire & Teixeira, 2018). Interests may also provide young people with opportunities to test their abilities, establish social relationships, and develop individual strategies for coping with stress and uncertainty. In this sense, a broad spectrum of interests and preferred activities can be considered a natural component of developmental adaptation (O’Flaherty et al., 2022).

However, the boundary between an intense interest and a potentially maladaptive behavioral pattern is not always clearly defined. Under conditions of psychological vulnerability, emotional instability, low self-esteem, or difficulties in adapting to changing educational and social demands, some preferred activities may

become increasingly dominant. Their role may gradually shift from self-expression and constructive engagement toward emotional compensation, stress avoidance, or escape from difficult interpersonal and developmental challenges. In such circumstances, stable behavioral preferences may acquire features of addictive tendencies and, in some individuals, develop into more pronounced addictive patterns (Estupiñá et al., 2024; González-Roz et al., 2024).

This problem is particularly relevant during transitions between educational stages. Entry into a new educational environment requires adapting to unfamiliar academic and social conditions, whereas completing an educational stage is associated with uncertainty about the future, changing social roles, and the need to prepare for the next stage of life. Therefore, students at the beginning and at the end of the same educational level may differ substantially in their psychological characteristics, self-esteem, emotional state, and behavioral preferences. These differences may reflect not only chronological age but also different levels of readiness for upcoming developmental and social transitions (Sundqvist et al., 2024).

One of the most extreme forms of withdrawal from increasing social and developmental demands is hikikomori. Initially described in Japan, hikikomori is characterized by prolonged and marked social withdrawal and a substantial reduction in participation in education, employment, and interpersonal relationships (Kato et al., 2020). Although the phenomenon has historically been associated with Japanese society, social withdrawal resembling hikikomori has increasingly been reported in different cultural contexts and is now considered a broader psychosocial problem affecting adolescents and young adults (Zhang et al., 2025).

Most studies of addictive behavior and hikikomori examine individual addictions, psychological risk factors, or social withdrawal as relatively separate phenomena. Considerably less attention has been paid to possible age-related changes in the overall pattern of behavioral interests and addictive tendencies. It remains unclear whether the spectrum of addictive behaviors simply expands with increasing psychological vulnerability or whether the structure and functional role of these behaviors may change during adolescence and early adulthood.

We propose that interests, stable behavioral preferences, addictive tendencies, and social withdrawal should not necessarily be viewed as completely independent behavioral phenomena. Rather, under certain psychological and social conditions, they may represent different manifestations of changing strategies of adaptation. Interests and preferred activities may initially serve as natural mechanisms of self-expression, emotional regulation, and interaction with the environment. With increasing psychological vulnerability or difficulties in adapting to new developmental and educational demands, some activities may become increasingly dominant and acquire features of addictive behavior. In certain individuals, the range of such behavioral strategies may subsequently narrow, with social withdrawal emerging as a dominant maladaptive response.

Accordingly, we hypothesized that age-related development is associated not only with changes in the prevalence of individual addictive tendencies but also

with a transformation of their overall pattern. We further assumed that differences between the initial and final stages of successive educational levels may reflect transition-related restructuring of adaptive behavior, associated with changes in self-esteem, psychological state, and readiness to meet the demands of the next stage of life.

The aim of this study was to examine age- and education-related changes in psychological characteristics, addictive behavior patterns, and hikikomori risk among students across successive educational stages, and to assess whether these changes reflect a transformation of adaptive and maladaptive behavioral strategies during adolescence and early adulthood.

2. Materials and Methods

2.1. Study Design and Participants

The study was conducted using a cross-sectional comparative design and included students representing successive educational stages from adolescence to early adulthood. The sample comprised school pupils, college students, and university students at the initial and final stages of their respective educational levels.

A total of 269 students participated in the study, including 117 males and 152 females. The study was conducted from February to April 2024. The participants were divided into six educational and developmental groups: pupils of Novosibirsk Secondary School No. 155; students of the Novosibirsk City Open College; and students of Novosibirsk State Pedagogical University (**Table 1**).

The selection of these groups was determined by the conceptual design of the study. The eighth and tenth grades represented different stages of secondary school education, whereas first- and fourth-year college and university students represented the initial and final stages of professional education. This design made it possible to compare students not only across different age and educational groups but also between the beginning and completion of successive educational stages.

Participants were recruited using convenience sampling from the educational institutions involved in the study. Inclusion criteria were enrollment in one of the selected educational groups, ages between 14 and 22 years, physical and psychological health, and voluntary participation. Questionnaires with incomplete HQ-25 data were excluded from the corresponding analysis.

Table 1. Distribution of study participants.

Group	n	Age (Mean $\pm$ SD)	Male (n)	Female (n)
8th-grade school	56	14 $\pm$ 0.4	24	32
10th-grade school	50	16 $\pm$ 0.5	22	28
1st year College	45	15 $\pm$ 0.6	23	22
4th year College	36	18 $\pm$ 0.7	14	22
1st year University	46	17 $\pm$ 0.5	20	26
4th year University	36	21 $\pm$ 0.6	14	22

The educational stages were considered cross-sectional developmental markers rather than direct indicators of individual developmental trajectories. Accordingly, differences between the groups were interpreted as age- and education-related characteristics and not as longitudinal changes within the same individuals.

The distributions of hikikomori severity, psychological characteristics, and gender differences across educational stages were subsequently compared using inferential statistical analysis.

2.2. Assessment of Hikikomori Tendencies

The tendency toward social withdrawal was assessed using the Russian-language version of the 25-item Hikikomori Questionnaire (HQ-25). Participants were classified according to HQ-25 cutoff values proposed by Teo et al. (2018) and validated in the Russian version by Lyakina et al. (2023). The original HQ-25 cutoff score of 42 points, proposed by Teo et al., indicates risk for hikikomori. Since the present study was aimed at examining the gradual development of psychological vulnerability before the diagnostic threshold was reached, participants were further stratified into three analytical groups for the purposes of the present study: 0 - 29 points (no pronounced hikikomori tendency), 30 - 59 points (hikikomori risk group), and more than 60 points up to 100 points (high hikikomori indicators). This subdivision was introduced by the authors to analyze intermediate stages of hikikomori-related vulnerability and does not represent an official HQ-25 classification.

Based on the questionnaire results, the participants were classified according to the degree of hikikomori expression. Three categories were considered in the subsequent analysis: students without a pronounced tendency toward hikikomori, students belonging to the hikikomori risk group, and students with high hikikomori indicators. This classification allowed us to compare psychological characteristics and addictive tendencies not only across educational and age groups but also in relation to the increasing expression of social withdrawal.

2.3. Assessment of Psycho-Emotional Characteristics

The psycho-emotional state of the participants was evaluated using a set of psychological assessment methods aimed at identifying nervous tension, self-esteem, and anxiety.

The level of nervous tension was assessed using the Nervous Tension Level screening test (*Nervous Tension Level Test*, n.d.), which classified participants as having low, moderate, or high levels. This indicator was considered an important characteristic of the functional psychological state and the individual's response to educational and social demands.

Self-esteem was evaluated using the Express Diagnostics of Self-Esteem Level method (*Express Diagnostics of Self-Esteem Level*, n.d.). Based on the scores obtained, self-esteem was classified as low, normal, or high. Particular attention was

paid to differences between students at the initial and final stages of each educational level, since self-esteem may reflect both the individual's current psychological state and perceived readiness to meet new educational, professional, and social challenges.

Anxiety was assessed using the Phillips School Anxiety Scale (Phillips, 1978). The results were classified into normal, elevated, and high levels of anxiety. In the comparative analysis, special attention was given to the distribution of anxiety levels among students in the hikikomori risk group and among those with high hikikomori indicators.

Taken together, these psychological characteristics were used to describe the psycho-emotional background associated with different degrees of social withdrawal and to assess possible differences related to educational and developmental transitions.

2.4. Assessment of Addictive Tendencies

Tendencies toward different forms of addictive behavior were assessed using the Lozovaya questionnaire for diagnosing predisposition to various addictions (Lozovaya, n.d.). The method made it possible to identify tendencies toward alcohol, love, gaming, sexual, food, work, computer, and tobacco addictions.

The analysis was performed at several levels. First, the spectrum of addictive tendencies was examined separately in each of the six educational and developmental groups. Second, addictive patterns were compared between students belonging to the hikikomori risk group and those with high hikikomori indicators. Third, gender differences in the distribution of individual addictive tendencies were analyzed across the successive educational stages.

In addition to examining individual types of addictive tendencies, we analyzed the total number of identified addictive tendency categories in students with different degrees of hikikomori expression. This analysis was used to assess whether increasing hikikomori expression was associated with a simple accumulation of addictive tendencies or with a change in the overall pattern and diversity of addictive behavior.

This aspect of the analysis was particularly important to the study's conceptual aim, which was to examine possible changes in behavioral patterns across adolescence and early adulthood, as well as during educational transitions.

2.5. Statistical Analysis

Descriptive statistics were calculated for all study variables. Differences in the distribution of categorical variables among educational groups and between male and female students were analyzed using Pearson's chi-square (χ^2) test. Statistical significance was established at $p < 0.05$. Statistical analyses were performed using IBM SPSS Statistics (IBM Corp., Armonk, NY, USA).

Because testing was conducted on different days and occasional questionnaire responses were missing, the number of participants included in individual anal-

yses varied slightly across psychological measures. Each analysis was performed using all available data for the corresponding measure. When expected cell frequencies were low, exact tests were used instead of Pearson's chi-square test. Effect size for contingency tables was estimated using Cramér's V.

2.6. Ethical Considerations

The study was conducted in accordance with generally accepted ethical principles for psychological and educational research involving adolescents and young adults. Participation was voluntary, and the confidentiality of individual results was maintained throughout data collection and analysis.

The data obtained were analyzed and presented in aggregate form, without information allowing the identification of individual participants.

3. Results

3.1. Hikikomori Tendencies across Educational and Developmental Stages

The first stage of the analysis examined the prevalence of hikikomori tendencies among students representing successive educational and developmental stages from adolescence to early adulthood.

A substantial proportion of students in the hikikomori risk group was identified across all educational stages (Figure 1). The proportion of at-risk students ranged from 35% among eighth-grade pupils to 51% among first-year college students. In the other groups, the prevalence of hikikomori risk remained similarly high: 40% among tenth-grade pupils, 42% among fourth-year college students, and 50% among both first- and fourth-year university students.

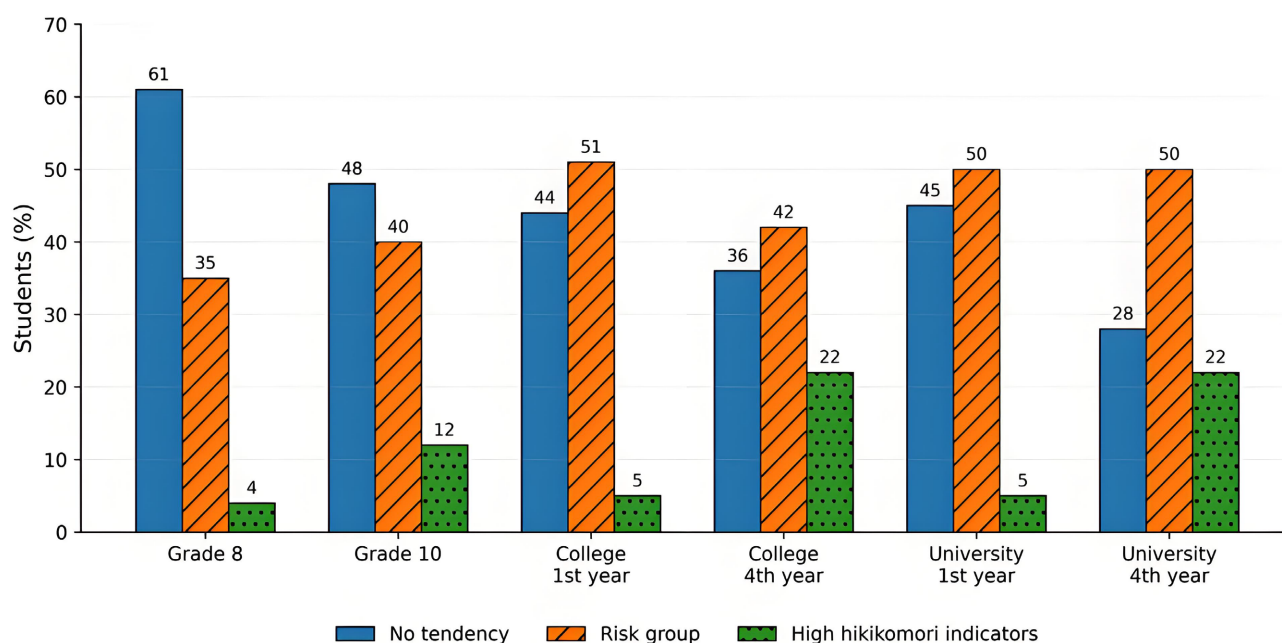


Figure 1. Prevalence of hikikomori tendencies among students at different educational and developmental stages.

The proportion of students with high hikikomori indicators demonstrated a different pattern. Such students accounted for only 4% of eighth-grade pupils, 5% of first-year college students, and 5% of first-year university students. However, the prevalence increased to 12% among tenth-grade pupils and reached 22% among both fourth-year college and fourth-year university students.

The distribution of students across the three hikikomori categories differed significantly across educational stages (Pearson's $\chi^2 = 23.85$, $df = 10$, $p = 0.008$), indicating educational-stage differences in hikikomori severity.

Thus, hikikomori risk was widely represented across all educational stages examined, whereas high hikikomori indicators were more frequently observed at the final stages of secondary school, college, and university education. This pattern suggests that pronounced social withdrawal may be particularly relevant during periods associated with the completion of an educational stage and preparation for subsequent developmental and social transitions.

3.2. Gender Differences in Hikikomori Tendencies

Gender analysis showed that the distribution of hikikomori tendencies varied with the degree of social withdrawal (Figure 2).

Within the hikikomori risk group, no consistent gender predominance was observed across all educational stages. The proportions of male and female students were generally comparable, although male predominance was more evident among tenth-grade pupils and first-year university students.

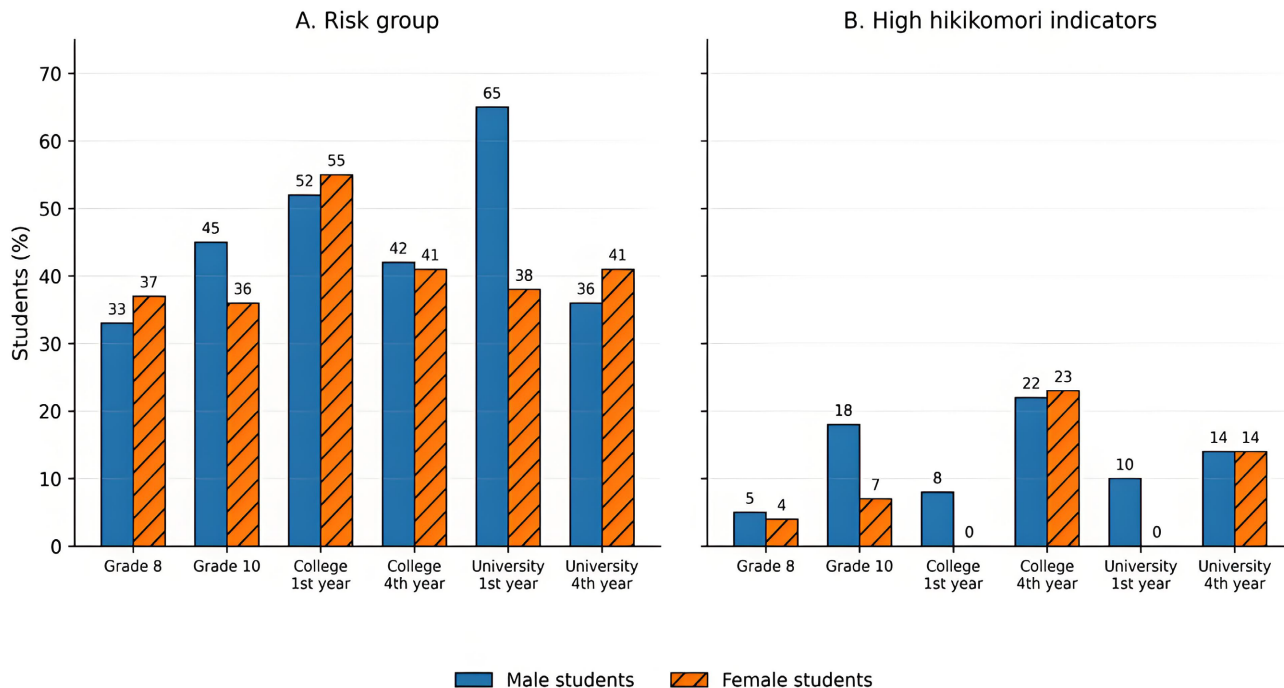


Figure 2. Gender distribution of hikikomori tendencies across educational stages (% of students in each gender group).

A different pattern was observed among students with high hikikomori indicators. Pronounced manifestations of social withdrawal were more frequently iden-

tified among male students in almost all educational and age groups. Although female students were widely represented in the risk group, progression toward more pronounced hikikomori characteristics appeared to be more common among males.

No statistically significant gender differences were found either in the hikikomori risk group (Pearson's $\chi^2 = 0.78$, $df = 1$, $p = 0.378$) or among students with high hikikomori indicators (Pearson's $\chi^2 = 1.75$, $df = 1$, $p = 0.185$). Nevertheless, high hikikomori indicators were descriptively more frequent among male students than among female students (12.0% vs. 7.2%).

Therefore, gender differences were limited at the level of hikikomori risk. Although high hikikomori indicators were more frequent among male students in the descriptive analysis, this difference did not reach statistical significance.

3.3. Nervous Tension in Students with Different Degrees of Hikikomori Expression

The next stage of the study examined the psycho-emotional characteristics of students belonging to the hikikomori risk group and those with high hikikomori indicators.

Among students in the risk group, moderate nervous tension predominated across all educational stages (**Figure 3(A)**). Nevertheless, a considerable proportion of students also exhibited high levels of nervous tension, reaching approximately 20% in some groups. The highest prevalence of high nervous tension was observed among students at the final stages of education: tenth-grade pupils, fourth-year college students, and fourth-year university students (*Nervous Tension Level Test*, n.d.).

Among students with high hikikomori indicators, high nervous tension was more common than in the risk group (**Figure 3(B)**). The highest values were again observed at the final stages of school, college, and university education.

The distribution of nervous tension levels differed significantly between the hikikomori risk group and students with high hikikomori indicators (Pearson's $\chi^2 = 10.16$, $df = 2$, $p = 0.006$; Cramér's $V = 0.26$). High nervous tension was observed in 28.2% of students in the risk group and 58.1% of students with high hikikomori indicators, indicating a shift toward greater psychological tension as hikikomori expression increases. The same pattern was observed across all educational groups: students with high hikikomori indicators consistently showed a higher proportion of high nervous tension than students in the risk group. However, within individual educational groups, these differences did not reach statistical significance, most likely because of the limited sample size in several subgroups.

Thus, increased hikikomori expression was accompanied by a shift toward higher levels of nervous tension, while the greatest psycho-emotional tension was repeatedly observed at the completion of successive educational stages.

3.4. Self-Esteem and Educational Stage

Marked differences in self-esteem were identified both in relation to hikikomori expression and educational stage (**Figure 4**).

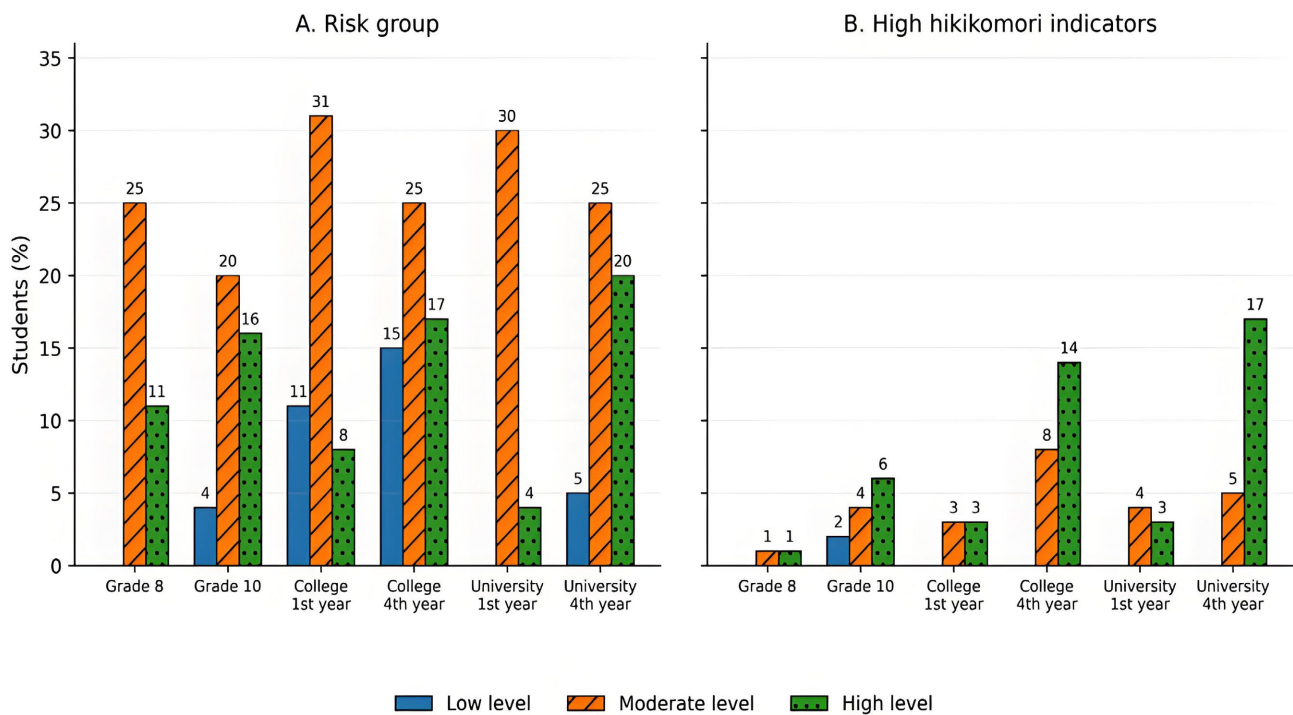


Figure 3. Levels of nervous tension among students in the hikikomori risk group (A) and students with high hikikomori indicators (B).

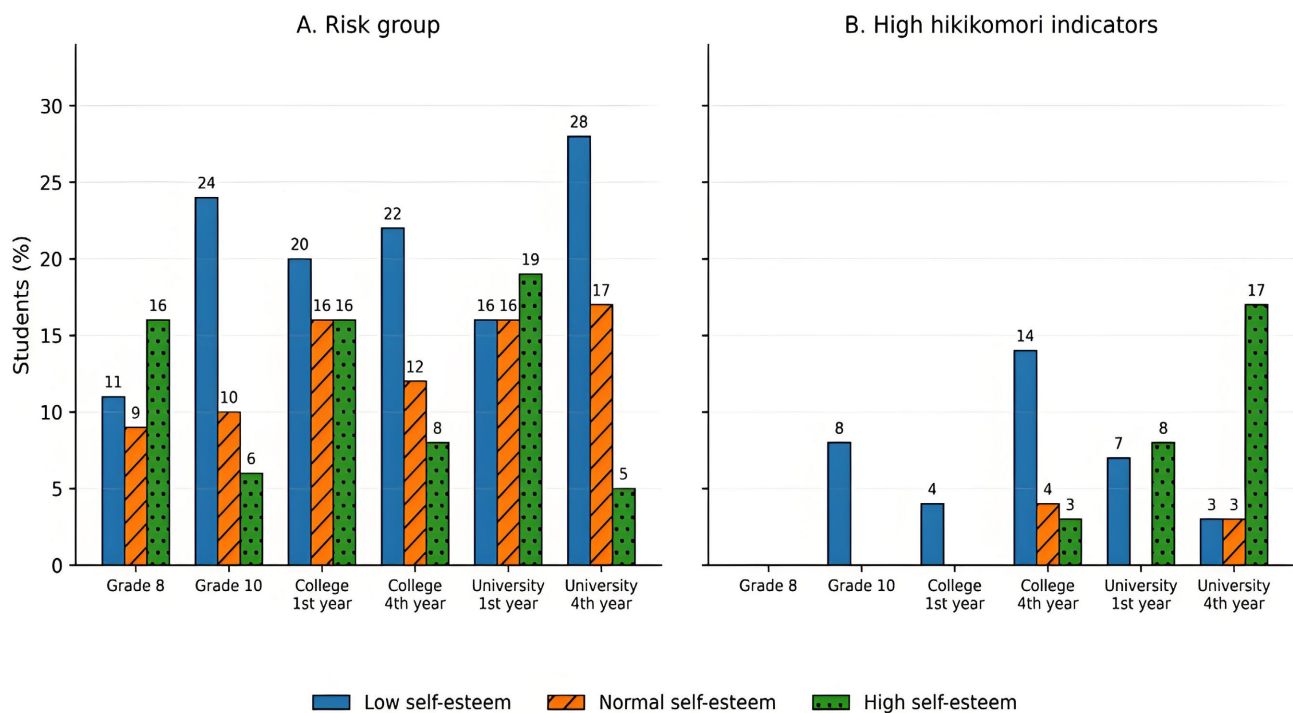


Figure 4. Self-Esteem levels among students with different degrees of hikikomori expression.

Among students belonging to the hikikomori risk group, low self-esteem predominated at the final stages of secondary school, college, and university education. In contrast, high self-esteem was more frequently observed among students at the initial stages of a new educational level, particularly first-year college and

university students. The proportion of students with normal self-esteem was relatively similar across the educational groups examined.

Among students with high hikikomori indicators, normal self-esteem was uncommon, occurring in only a small proportion of respondents. Most students with pronounced hikikomori characteristics demonstrated low self-esteem. Although students with high hikikomori indicators tended to demonstrate less favorable self-esteem profiles than students in the risk group, the overall distribution of self-esteem levels did not differ significantly between the groups (Pearson's $\chi^2 = 4.25$, $df = 2$, $p = 0.120$; Cramér's $V = 0.17$).

At the same time, high self-esteem was also observed in some fourth-year college and university students.

Across all educational groups, the same pattern was observed: students with high hikikomori indicators consistently demonstrated lower self-esteem than students in the risk group. Although these differences did not reach statistical significance within either the overall sample or individual educational groups, the same tendency was observed throughout all stages of education.

The distribution of self-esteem, therefore, did not demonstrate a simple linear age-related pattern. Instead, differences between the initial and final stages of education were repeatedly observed. Higher self-esteem was more characteristic of entry into a new educational stage, whereas low self-esteem was more common near its completion.

3.5. Anxiety as a Psychological Characteristic of Hikikomori Risk

Anxiety was widely represented among students with hikikomori tendencies (**Figure 5**).

In the hikikomori risk group, only 10% - 15% of students at different educational stages demonstrated normal anxiety levels. Elevated anxiety was particularly common among first-year college and first-year university students, where it was identified in 32% and 27% of respondents, respectively. High anxiety was also observed in all educational groups and reached its highest value among fourth-year university students.

Among students with high hikikomori indicators, normal anxiety was almost absent, except among a small proportion of fourth-year college students. Elevated and high anxiety predominated in this group. Particularly high levels were again observed among students completing their educational stages, including tenth-grade pupils and fourth-year college and university students.

The distribution of anxiety levels differed significantly between the hikikomori risk group and students with high hikikomori indicators (Pearson's $\chi^2 = 12.91$, $df = 2$, $p = 0.002$; Cramér's $V = 0.29$). Students with high hikikomori indicators demonstrated a substantially higher proportion of severe anxiety and a markedly lower proportion of normal anxiety than students in the risk group, suggesting that increasing hikikomori severity is associated with elevated anxiety levels.

Thus, anxiety was characteristic of both the hikikomori risk group and students

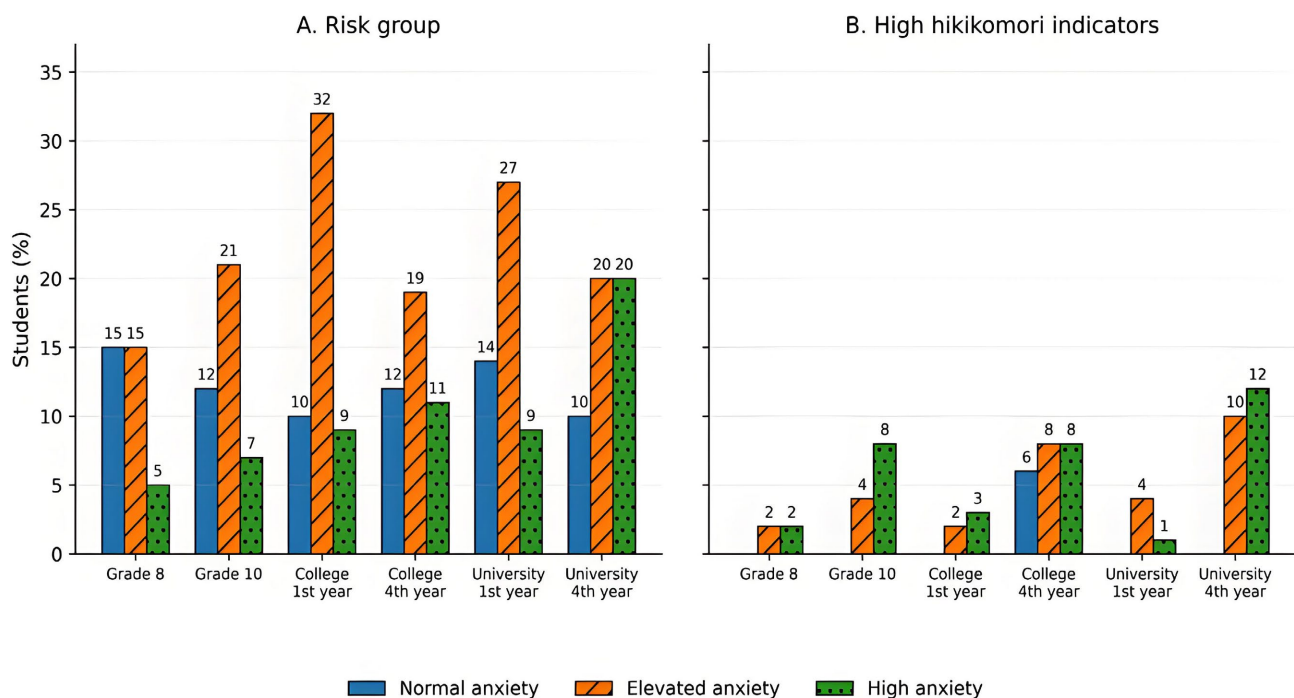


Figure 5. Anxiety levels among students in the hikikomori risk group and students with high hikikomori indicators.

with pronounced hikikomori manifestations. However, the pattern differed across educational stages: elevated anxiety was particularly evident at entry into college and university, whereas high anxiety became more pronounced at the final stages of education.

3.6. Age- and Education-Related Changes in Addictive Tendencies

The spectrum of addictive tendencies changed considerably across successive educational and developmental stages.

Among eighth-grade pupils in the hikikomori risk group, gaming and computer addiction tendencies predominated, affecting 17% and 12% of students, respectively (**Figure 6(A)**). The same types of tendencies were identified among students with high levels of hikikomori indicators, though at lower frequencies.

By the tenth grade, the spectrum of addictive tendencies had expanded. In addition to gaming and computer tendencies, love- and food-related addictive tendencies were identified. Gaming tendencies remained the most frequent in the risk group, affecting 14% of tenth-grade pupils.

A further restructuring of addictive tendencies was observed among college students (**Figure 6(B)**). Among first-year college students in the hikikomori risk group, gaming and computer tendencies were the most common, both identified in 13% of respondents. Tobacco-related tendencies were also frequent and were observed in 10% of students. Tendencies associated with alcohol use, love, and sexual behavior were additionally identified.

By the fourth year of college, gaming and computer tendencies were no longer as clearly predominant as in younger groups. The pattern became more diverse

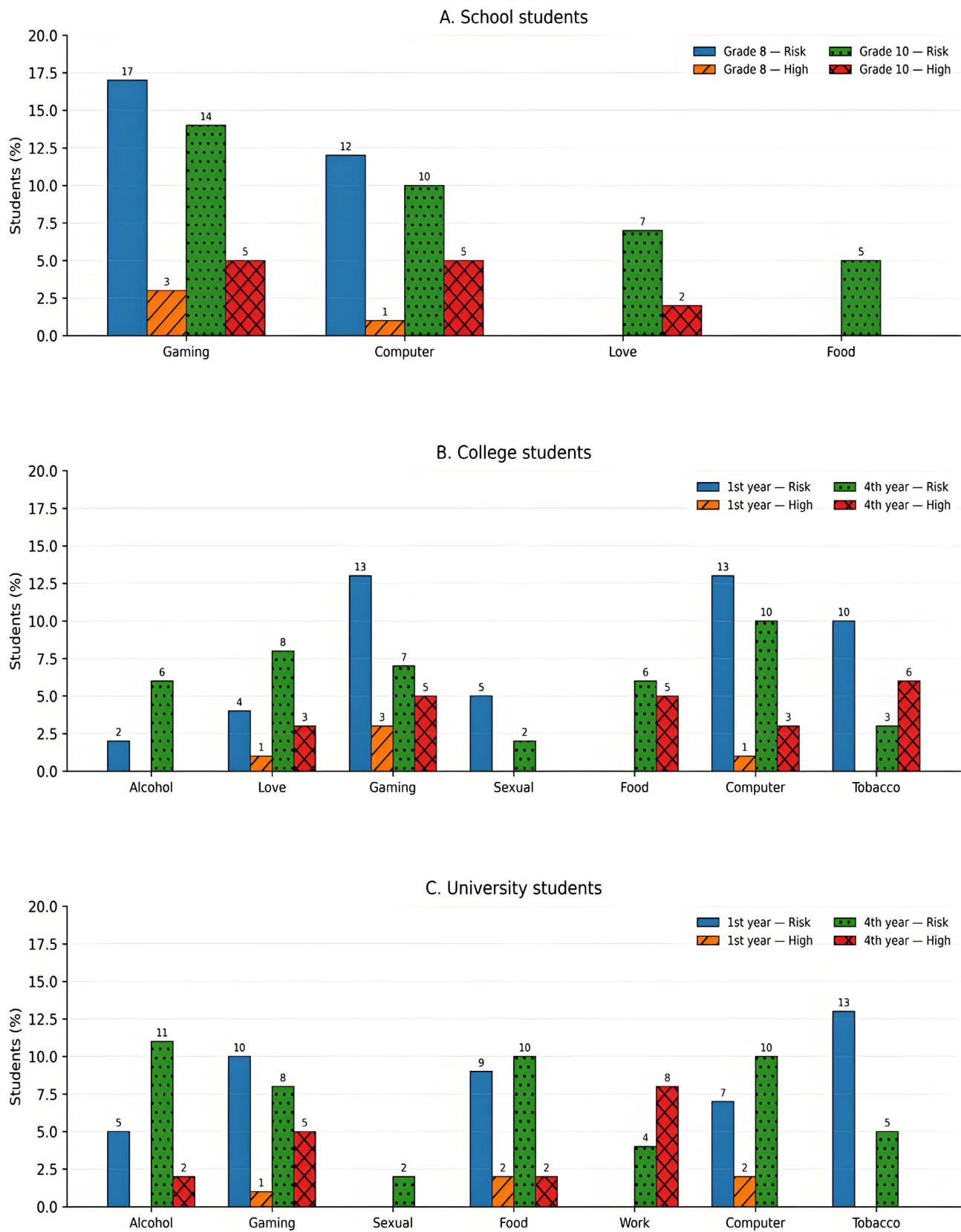


Figure 6. Addictive tendencies among school (A), college (B), and university students (C) with different degrees of hikikomori expression.

and included alcohol-, love-, gaming-, sexual-, food-, computer-, and tobacco-related tendencies. Alcohol-related tendencies were identified in 6% of students in the risk group, whereas love-related tendencies reached 8%. Among students with high hikikomori indicators, love-, food-, and tobacco-related tendencies were among the more frequently identified patterns.

University students demonstrated a further change in the structure of addictive tendencies (**Figure 6(C)**). Among first-year university students in the hikikomori risk group, tobacco-related tendencies were the most frequent and were observed in 13% of respondents. Gaming tendencies were identified in 10%, food-related tendencies in 9%, computer tendencies in 7%, and alcohol-related tendencies in 5%.

Among fourth-year university students in the hikikomori risk group, alcohol-related tendencies increased to 11%. Work-related and tobacco-related tendencies were each identified in 10% of students, while gaming tendencies remained present in 8%. Among students with high hikikomori indicators, work- and gaming-related tendencies predominated, with alcohol-related tendencies identified less frequently.

Overall, the findings demonstrated a marked age- and education-related restructuring of addictive behavior. Gaming and computer tendencies predominated during school years and remained important during the early stages of college and university education. With increasing age and progression through educational stages, tendencies related to tobacco and alcohol use, interpersonal relationships, and work became increasingly represented.

3.7. Gender-Specific Patterns of Addictive Tendencies

The distribution of individual addictive tendencies also demonstrated gender-related differences (**Table 2**).

Table 2. Gender differences in students' predisposition to different types of addictive behavior across educational stages (% of respondents).

Addictive tendency	Grade 8		Grade 10		College 1		College 4		University 1		University 4	
	M	F	M	F	M	F	M	F	M	F	M	F
Alcohol					2		5	2	2	3	7	6
Love			3	6		4	2	3				
Gaming	13	7	11	8	9	5	10	3	8	3	10	3
Sexual					3	2	5	5			2	
Food				5				2	4	5		2
Work											11	8
Computer	8	5	10	5	11	5	6		7	2	4	
Tobacco					6	5	10	6	10	5	5	5
Not detected	2	4		4	4			3	2	4	5	

M—males; F—females.

The overall number and diversity of addictive tendencies increased across successive educational stages in both male and female students. Alcohol-related tendencies were more frequently identified among males, particularly in older educational groups. Love-related tendencies were more characteristic of female students, whereas gaming and computer tendencies occurred in both genders but were generally more pronounced among males. Food-related addictive tendencies were more frequently identified among female students. Tobacco-related tendencies emerged primarily among college and university students of both genders, but were generally more common among males. No consistent gender differences were observed for sexual or work-related addictive tendencies.

A descriptive analysis also revealed age-related gender differences in the overall number of students demonstrating addictive tendencies. During secondary school, the number of male and female students with addictive manifestations was comparable. However, beginning with college education, male students consistently predominated, with the largest difference observed among fourth-year college students (15 males vs. 8 females) and first-year university students (13 males vs. 7 females). These findings may suggest that male students become increasingly vulnerable to addictive behaviors during the transition from adolescence to early adulthood.

Despite these gender-specific differences, gaming and computer tendencies remained characteristic of students across a broad developmental range, from school to university.

3.8. Diversity of Addictive Tendencies and Hikikomori Expression

To examine whether increasing hikikomori expression was associated with a simple accumulation of addictive tendencies, the total number of identified addictive manifestations across educational groups was compared among students without hikikomori manifestations, students in the hikikomori risk group, and students with high hikikomori indicators (**Table 3**).

Across the six educational groups, a total of eight addictive tendency occurrences were identified among students without hikikomori manifestations. In contrast, the total number of identified addictive tendency occurrences increased sharply to 29 in the hikikomori risk group. Among students with high hikikomori indicators, this number decreased to 19.

The same general pattern was observed across educational stages. Students in the hikikomori risk group consistently demonstrated a broader spectrum of addictive tendencies than students without hikikomori manifestations. Importantly, however, a further increase in hikikomori expression was not accompanied by a continued expansion of addictive tendencies. Instead, the total number of identified addictive tendency manifestations decreased from 29 in the risk group to 19 among students with high hikikomori indicators.

Thus, the relationship between hikikomori expression and addictive tendencies was non-linear. The greatest diversity of addictive tendencies was observed at the

level of hikikomori risk, whereas pronounced social withdrawal was associated with a partial narrowing of the cumulative number of detected addictive tendency manifestations.

This pattern indicates that the hikikomori risk stage is characterized by the greatest diversity of addictive tendencies. In contrast, pronounced hikikomori manifestations are associated not with further behavioral diversification but with a reduction in the range of other addictive tendencies.

Table 3. Cumulative number of detected addictive tendency manifestations in students with different levels of hikikomori expression.

Group	Not detected	Risk group	High Indicators
Grade 8	1	2	2
Grade 10	1	4	3
College 1 year	2	6	3
College 4 year	1	6	5
University 1 year	1	5	3
University 4 year	2	6	4
Total	8	29	19

4. Discussion

The present study examined psychological characteristics, addictive tendencies, and hikikomori expression across successive educational stages spanning adolescence and early adulthood. The findings demonstrate that these phenomena do not change independently. Rather, they appear to form an interconnected pattern reflecting differences in psychological vulnerability, behavioral preferences, and responses to changing developmental and educational demands.

Three major findings deserve particular attention. First, hikikomori risk was highly prevalent across all examined groups, whereas pronounced hikikomori manifestations were more frequently observed at the final stages of successive educational levels. Second, differences between the initial and final stages of education were repeatedly observed in nervous tension, anxiety, and self-esteem. Third, the diversity of addictive tendencies showed a non-linear association with hikikomori expression: the broadest spectrum was identified in the hikikomori risk group, whereas students with pronounced hikikomori characteristics demonstrated a smaller range of other addictive tendencies.

Taken together, these findings suggest that adaptive and maladaptive behavior during adolescence and early adulthood should be considered as dynamic and potentially reorganized in response to developmental and educational transitions.

4.1. Educational Transitions as Periods of Adaptive Restructuring

The present study revealed pronounced differences in psychological characteristics, hikikomori tendencies, and addictive behavior patterns across successive ed-

educational stages. Importantly, these differences were observed not only between age groups but also between students at the beginning and at the end of the same educational level.

This finding suggests that the educational stage itself may represent an important contextual factor influencing adaptive behavior. Entry into a new educational environment requires adjustment to unfamiliar academic demands, new interpersonal relationships, and changes in social status. Educational transitions have been shown to affect loneliness and mental health in adolescents and emerging adults, with individual differences in coping and perceived security playing an important role in the adaptation process (Sundqvist et al., 2024).

In contrast, students approaching the completion of an educational stage face a different set of adaptive demands. Graduation is associated with uncertainty regarding future education, employment, professional identity, and social roles. Thus, the initial and final stages of the same educational level may represent psychologically distinct periods of adaptation.

Our findings support this interpretation. Differences between first- and fourth-year college and university students were observed in self-esteem, nervous tension, anxiety, hikikomori indicators, and the spectrum of addictive tendencies. These differences may reflect not simply chronological maturation but transition-related restructuring of adaptive behavior.

From this perspective, adaptation during adolescence and early adulthood should not be viewed as a linear process. Rather, it may involve repeated cycles of psychological mobilization, adjustment, relative stabilization, and renewed vulnerability in anticipation of the next developmental or educational transition. Recent qualitative research similarly indicates that educational transitions may be accompanied by changes in the sense of security and by a period of emotional navigation and coping (Sundqvist et al., 2024).

4.2. Interests and Addictive Tendencies as Components of Adaptive Behavior

One of the important findings of the present study was the high prevalence and diversity of behavioral interests and addictive tendencies among students across all educational stages. Gaming, computer use, romantic attachment, food-related behavior, tobacco use, work, and other activities were represented to varying degrees in different age and educational groups.

These findings should not necessarily be interpreted as evidence of widespread clinical addiction. During adolescence and early adulthood, preferred activities may serve multiple psychological functions, including emotional regulation, self-expression, communication, identity formation, and coping with uncertainty. Participation in meaningful leisure activities has been associated with positive functioning and emotion regulation in adolescents (Freire & Teixeira, 2018).

The functional meaning of a preferred activity may, however, change depending on its intensity, dominance, and role in regulating psychological state. Under

conditions of increasing emotional dysregulation, a behavior initially associated with interest or pleasure may become increasingly important as a means of compensation or avoidance. Meta-analytic evidence indicates a consistent association between emotional dysregulation and both substance-related and behavioral addictions (González-Roz et al., 2024).

This interpretation is particularly relevant to gaming and computer-related behavior. Gaming may serve not only as entertainment but also as a strategy for managing negative emotional states or escaping stressful experiences. At the same time, the relationship between Internet use and social withdrawal is not necessarily unidirectional. Gavin and Brosnan (2022), for example, found that increased Internet use during COVID-19 restrictions was associated with a reduced risk of hikikomori and suggested that online social interaction may in some circumstances mitigate social withdrawal.

Thus, the type of activity alone may be insufficient to distinguish adaptive from maladaptive behavior. Its psychological function, degree of dominance, and relationship with other forms of activity may be more informative. This distinction is central to the interpretation of the present findings.

4.3. Psychological Vulnerability and Hikikomori Risk

The present results demonstrated that increased hikikomori expression was accompanied by changes in nervous tension, self-esteem, and anxiety. Although the exact pattern differed across educational stages, students in the hikikomori risk group and those with high hikikomori indicators frequently showed signs of psychological vulnerability.

This observation is consistent with previous research describing hikikomori as a heterogeneous phenomenon associated with emotional, cognitive, interpersonal, and behavioral difficulties. In adolescents, environmental and psycho-behavioral factors have been shown to contribute to a spectrum of social withdrawal rather than to a simple dichotomy between hikikomori and non-hikikomori states (Hamasaki et al., 2021).

Nonaka and Sakai (2021) demonstrated that psychological stress, behavioral disengagement coping, instrumental support, and self-compassion were associated with hikikomori behavior. These findings are particularly relevant to our interpretation because they suggest that social withdrawal may be linked not only to the severity of psychological distress but also to the strategies used to respond to that distress.

The anxiety findings of the present study should also be considered in the context of educational stress. The Phillips School Anxiety Scale was originally developed to assess anxiety associated with the school environment (Phillips, 1978). A recent standardization study of the modified Russian-language version in 2,105 school students confirmed its construct validity and satisfactory correspondence between the empirical data and the questionnaire structure (Egorenko et al., 2023). Although the present study used the previously established Russian meth-

odological version, these contemporary psychometric data support the relevance of the Phillips framework for assessing anxiety in educational contexts.

Taken together, the additional statistical analyses demonstrated that increasing hikikomori severity was consistently associated with greater psychological vulnerability. Statistically significant differences were observed for nervous tension and anxiety, whereas self-esteem showed the same directional tendency without reaching statistical significance. This pattern suggests that psychological vulnerability, rather than any single psychological characteristic, may represent the principal context in which hikikomori develops. The subdivision of participants into three analytical groups made it possible to examine the gradual progression of psychological vulnerability before the conventional diagnostic threshold for hikikomori was reached.

Cross-cultural studies further demonstrate that hikikomori cannot be regarded solely as a culturally specific Japanese phenomenon. [Teo et al. \(2015\)](#) identified individuals with hikikomori in all four countries included in their study and reported high levels of loneliness and substantial impairment in social and occupational functioning. These observations support our interpretation of hikikomori tendencies as a broader maladaptive response that may emerge in psychologically vulnerable individuals facing difficulties in coping with social and developmental demands.

Thus, anxiety, nervous tension, and low self-esteem may be considered not as isolated psychological characteristics but as components of a broader vulnerability context. Within this context, the individual's behavioral strategies for coping with developmental and educational demands may become increasingly restricted.

4.4. From Behavioral Diversity to Social Withdrawal

The most conceptually important finding of the present study was the non-linear relationship between the diversity of addictive tendencies and the degree of hikikomori expression. The cumulative number of detected addictive tendency occurrences increased from 8 in students without pronounced hikikomori tendencies to 29 in the hikikomori risk group and then decreased to 19 among students with high hikikomori indicators.

At first glance, this pattern may appear paradoxical. If psychological maladaptation were associated simply with the accumulation of addictive behaviors, the greatest diversity of addictive tendencies would be expected among students with the highest hikikomori indicators. Our findings did not support this assumption.

Instead, the maximum diversity of addictive tendencies was observed at the intermediate stage—the hikikomori risk group. We propose that this pattern may reflect a period of active yet increasingly ineffective search for behavioral strategies to regulate psychological discomfort. At this stage, individuals may turn to multiple activities, including gaming, computer use, romantic attachment, food-related behavior, tobacco use, or other forms of behavioral engagement.

With increasing social withdrawal, however, the behavioral repertoire may be-

come narrower. Certain activities, particularly those compatible with reduced face-to-face social interaction, may acquire a dominant role, whereas other forms of activity become less represented. Qualitative accounts of hikikomori have described social withdrawal as a response to coping difficulties and feelings of powerlessness in situations perceived as difficult to change (Yong & Kaneko, 2016).

The broader experiential literature also emphasizes the importance of connectedness, identity, meaning in life, and empowerment in understanding hikikomori. A systematic review using the CHIME framework demonstrated that these dimensions are central to the lived experiences of socially withdrawn individuals (Yung et al., 2021). This is consistent with our view that pronounced social withdrawal may involve not merely an increase in the severity of individual addictive behaviors but a broader reorganization of the individual's relationship with the social environment.

Therefore, the observed sequence of 8 → 29 → 19 addictive tendency categories may reflect a functional reorganization of maladaptive behavior. The hikikomori risk stage may be characterized by diversification of compensatory or avoidance strategies, whereas pronounced social withdrawal may be associated with narrowing of the behavioral repertoire and increasing dominance of avoidance-oriented behavior.

Accordingly, hikikomori should be viewed not as an isolated behavioral phenomenon but as one manifestation of a broader process of psychological vulnerability associated with educational transitions and changing adaptive demands.

Because of the cross-sectional design of the present study, this interpretation should be regarded as a conceptual hypothesis rather than as evidence of an individual developmental trajectory. Nevertheless, the observed pattern provides an empirical basis for further longitudinal investigation.

4.5. A Conceptual Model of Adaptive Behavior in Transition

Based on the present findings, we propose a conceptual model that considers adaptive and maladaptive behavioral patterns in the context of repeated educational and developmental transitions.

At the first level, interests and diverse activities represent natural components of adolescent and young adult development. They provide opportunities for self-expression, emotional regulation, social interaction, and identity formation.

At the second level, under conditions of psychological vulnerability or increased adaptive demands, certain activities may become stable behavioral preferences and acquire a stronger regulatory function. Emotional dysregulation is consistently associated with both substance-related and behavioral addictive patterns, supporting the importance of the regulatory function of behavior in the development of maladaptive tendencies (González-Roz et al., 2024).

At the third level, the spectrum of addictive tendencies may expand. This diversification may represent an attempt to maintain psychological stability through multiple compensatory or avoidance-oriented behaviors.

Finally, in some individuals, the behavioral repertoire may narrow and social withdrawal may become a dominant maladaptive strategy. Previous research has identified behavioral disengagement as a coping-related factor associated with hikikomori (Nonaka & Sakai, 2021).

This behavioral process interacts with repeated cycles of educational transition. Entry into a new stage is followed by active adaptation and relative stabilization. As the next transition approaches, uncertainty and adaptive demands increase again. The systematic review by Sundqvist et al. (2024) supports the broader relevance of educational transitions to loneliness and mental health during adolescence and emerging adulthood.

Psychological vulnerability—including anxiety, nervous tension, and low self-esteem—may influence the interaction between these processes. The proposed model therefore does not assume a simple linear progression from interests to addiction and hikikomori. Rather, it describes a dynamic interaction between behavioral strategies, psychological vulnerability, and changing environmental demands.

The conceptual model is summarized in Figure 7.

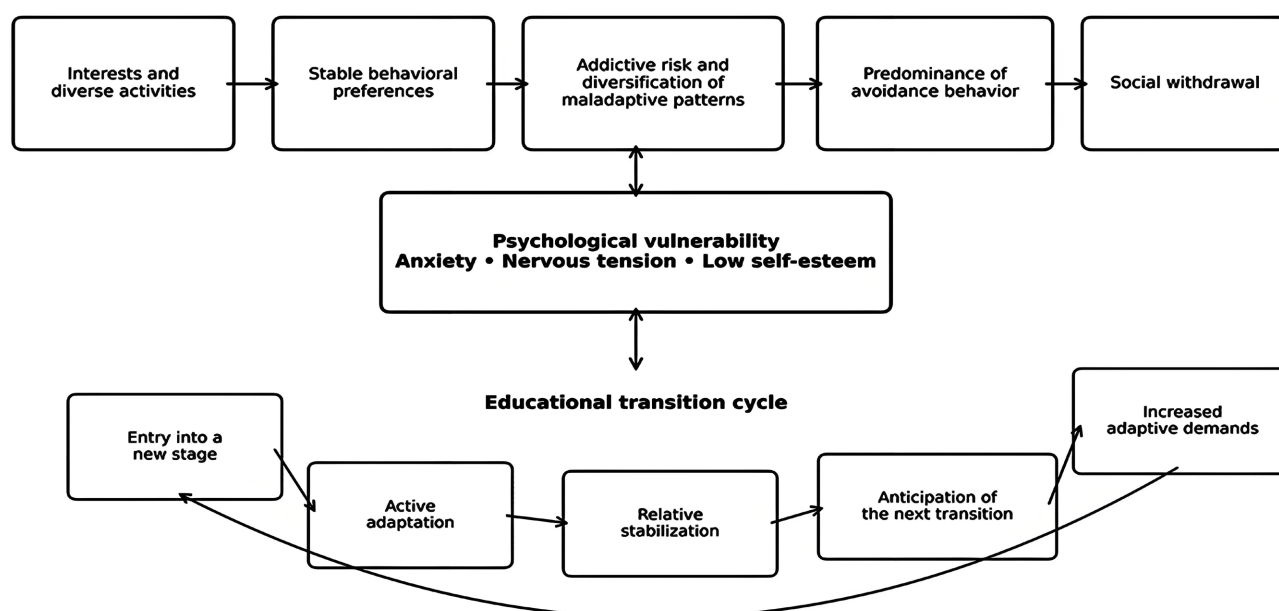


Figure 7. A Conceptual model of adaptive behavior in transition.

4.6. Practical Implications

The present findings have several implications for educational and psychological support. First, a broad range of interests and intensive engagement in particular activities should not automatically be interpreted as pathological. The psychological function of the activity and its place within the individual's broader behavioral repertoire should be considered.

Second, the beginning and completion of educational stages may represent important periods for preventive psychological support. Educational transitions can

influence loneliness and mental health and may involve changes in perceived security and coping demands (Sundqvist et al., 2024).

Third, students demonstrating multiple addictive tendencies together with increased anxiety, nervous tension, or reduced self-esteem may represent an important target group for early preventive interventions. At this stage, behavioral diversification may indicate an active search for compensatory strategies rather than a pattern of established social withdrawal.

Fourth, the descriptive predominance of male students with addictive manifestations during college and early university years suggests that preventive programs may require particular attention to young men during these educational transitions, when psychological vulnerability appears to increase.

Finally, preventive programs should focus not only on reducing individual addictive behaviors but also on strengthening adaptive coping strategies, emotional regulation, social connectedness, and readiness for upcoming educational and developmental transitions. The importance of connectedness, identity, meaning, and empowerment in hikikomori experiences supports a broader, person-centered approach to intervention (Yung et al., 2021).

5. Limitations and Future Directions

Several limitations of the present study should be acknowledged.

First, the cross-sectional design does not allow direct conclusions about individual developmental trajectories or causal relationships. The proposed sequence from behavioral interests and addictive tendencies toward social withdrawal is therefore a conceptual interpretation of differences between groups rather than a demonstrated longitudinal process.

Second, educational stage and chronological age are closely related in the examined sample. Although comparing the initial and final stages of school, college, and university education provides indirect evidence of transition-related differences, the independent contributions of age, educational environment, and anticipated life changes cannot be fully disentangled.

Third, the study relied on self-report psychological questionnaires. The identified addictive tendencies indicate predisposition or risk and should not be interpreted as clinically diagnosed addictive disorders. Similarly, high HQ-25 scores indicate pronounced hikikomori characteristics but do not independently establish a clinical diagnosis.

Fourth, the sample was drawn from educational institutions within one regional and sociocultural context. The generalizability of the findings to other populations and cultural environments therefore requires further investigation.

Finally, the proposed model of transition-related restructuring of adaptive behavior requires prospective verification. Longitudinal studies following the same individuals across educational transitions would make it possible to determine whether changes in psychological vulnerability and addictive tendencies precede increasing social withdrawal, accompany it, or develop as its consequence.

Future studies should also examine protective factors that allow psychologically vulnerable students to maintain a broad adaptive behavioral repertoire. Particular attention should be paid to social support, self-efficacy, emotional regulation, sense of belonging in education, and readiness for developmental transitions.

6. Conclusion

The present study demonstrates that psychological vulnerability, addictive tendencies, and hikikomori expression differ across adolescence and early adulthood and are closely associated with educational stage.

Hikikomori risk was highly prevalent in all examined groups, whereas pronounced manifestations of social withdrawal were more frequently observed at the final stages of school, college, and university education. These stages were also characterized by greater nervous tension, high anxiety, and, in many students, low self-esteem. In contrast, the initial stages of new educational levels were associated with a different psychological pattern, suggesting that entry into and completion of education may represent qualitatively different adaptive challenges.

The structure of addictive tendencies also changed across developmental and educational stages. Gaming and computer-related tendencies predominated among younger groups, whereas the spectrum increasingly included substance-related, interpersonal, food-related, and work-related tendencies with advancing age and educational attainment.

The most important finding was the non-linear relationship between the diversity of addictive tendencies and hikikomori expression. The broadest spectrum of addictive tendencies was observed in the hikikomori risk group, whereas students with pronounced hikikomori characteristics demonstrated a smaller range of other addictive tendencies.

These findings suggest that maladaptive behavior may undergo functional reorganization during periods of psychological vulnerability. Rather than reflecting a simple accumulation of addictive tendencies, increasing maladaptation may be associated with a transition from multiple behavioral patterns toward the predominance of avoidance and social withdrawal.

We therefore propose that hikikomori may, in some individuals, represent not merely an isolated form of problematic behavior but a dominant maladaptive response to increasing developmental and social demands. This interpretation requires longitudinal verification but provides a framework for understanding the relationship between behavioral interests, addictive risk, psychological vulnerability, and social withdrawal.

From an educational perspective, prevention should focus not only on individual addictions but also on preserving behavioral flexibility, supporting students during educational transitions, and identifying the progressive narrowing of interests and social participation. Adaptive behavior in transition may therefore be understood as a dynamic balance between expanding developmental demands and the individual's capacity to maintain diverse, constructive forms of interac-

tion with the social environment.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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