Proceedings of the 4th International Conference on Educational Innovation and Philosophical Inquiries
DOI: 10.54254/2753-7048/14/20231000

Involution and Pluralistic Ignorance Amongst Chinese Adolescents

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Abstract: What happens when people do not feel comfortable with competition but think others feel comfortable with the competition? How does such misaligned perception relate to people's motivation to achieve their goals and mental health? Drawing on the psychological science of pluralistic ignorance and an emerging social phenomenon of involution, I examine the relationship between perceptions of competition and the gap between intrinsic and extrinsic motivation and levels of depression among Chinese adolescents. Using online survey platform, student participants (N = 313) consistently reported that when they did not enjoy competition but thought their classmates enjoyed competition, they were more likely to show higher extrinsic motivation but lower intrinsic motivation when completing educational tasks. Moreover, students who misperceived others to enjoy competition more than themselves tended to report more severe levels of depression. I discuss theoretical contributions to the pluralistic ignorance literature and practical implications for educational well-being.

Keywords: pluralistic ignorance, involution, intrinsic motivation, extrinsic motivation, depression

1. Introduction

1.1. Definition of Involution

Over the past few years, the term "involution" has started to become popular in worldwide media. Involution refers to the excessive competition determined by unnecessary acts of studying or working for individuals to achieve their desired success. It is an entrapment crisis in which students or employees overwork themselves at exhausting levels [1].

Over-competition is particularly prevalent in modern China. Since the year 2020, the word "involution" has attracted significant attention on the internet [1][2]. The process of involution entraps those involved into a continuous roll of meaningless competition. For example, students may spend overwhelming amounts of time studying at instances when studying is not necessary. A recent online video highlights a student working on a computer while riding a bike [3]. To achieve success in a country with a large population, it is unavoidable to compete with others. However, over-competition may not be beneficial. What's more, many people who are participating in this over-competition may be unintentional and involuntary. The endless entrapment can be damaging.

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Based on the terminology used to describe a similar overwhelming involvement in competition in agriculture, involution captures the process in which farmers continue to increase the labor input in rice planting but produce at the cost of diminishing marginal returns regardless of efficiency [4][5]. The diminishing return is concerning. This phenomenon can be compared to that of an ant mill. An ant death spiral describes how an army of ants marches in a continuous circular path that results in exhaustion and death. This circular marching continued for an entire day, even in the rain, and even when numerous ants were weak and dead and trampled on by the rest of the moving army [6]. This creates a parallel pattern with the occurrence of continuous involution in the human community. The persistence of involution creates exhaustion, but the entrapment and involvement of this competition continue, seemingly untiringly. Involution can lead to mass exhaustion in the labor market.

1.2. Causes of Involution

How can we explain the emergence of involution? Past work has identified two causes. First, direct exploitation. Through employers obtaining elite employees by forcing people to work and compete, involution persists [1]. In this explanation there is a process of involution within the community of employees because the employers and the business market have intentionally set up an environment in which involution will provide them with elite workers. For instance, spiritual violence describes the crisis that the mass populations within the job market find their jobs meaningless but are still forced to work persistently in the inefficient system [7]. A poll in the United Kingdom evaluated that about 37 to 40 percent of the job market population said that their job made no meaningful contribution to their lives or to anything in general [7]. Everyone is busy and always on command to complete work given by their superior officers that simply exist. Leaders and bosses of high positions want a successful company, so they aggravate pressure on the managers below them to show good numbers and performance by a due date. The managers aggravate pressure onto their employees by increasing task load and setting unattainable KPIs.

Another cause can come from a culture that values homogeneity, which emphasizes nondifferentiation [8]. That is, if everyone focuses on the same life goals and wants to do whatever others do, endless competition can emerge. For example, instead of having a job at a distinguished company, one could find more enjoyment in pursuing their own interests in, for example, art. However, people who are affected by homogeneity have to obey the cultural norm. They follow what everyone else chooses and do what everyone else is doing. If everyone follows everybody else to over-work, then it may lead to persistent involution [8].

In sum, both direct exploitation and cultural homogeneity suggest that there are intentionally malicious actors who create excessive competition.

2. Methodology

2.1. Hypothesis

In this paper, I propose another explanation for involution. I propose a psychological mechanism. Specifically, I hypothesize that pluralistic ignorance causes involution. In particular, biased estimations about how others think of the competition and one's own perceptions of competition can lead to persistent involution. For example, if a student thinks other students in their class all enjoy studying, they will likely assume that they should study themselves, too. If every individual thinks this way, the result would be that everyone is studying and appears to enjoy studying. However, these seemingly enjoyable attitudes toward study are illusory perceptions. In fact, students do not necessarily enjoy the study. Nonetheless, competition continues, and involution results. Drawing on prior psychology literature, I first defined my key constructs of interest: pluralistic ignorance, involution in terms of intrinsic motivation and extrinsic motivation, and mental health.

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2.1.1. Pluralistic Ignorance

Prentice and Miller define pluralistic ignorance as the gap between an individual's perception of the social norm of certain behaviors and their personal comfort level with those same behaviors [5]. This is present, for example, in a classroom setting when it is asked for students to raise their hands if they have questions. Pluralistic ignorance is that students personally have questions, but do not raise their hands because they each believe that the other students in the room do not have questions. At some point, every student thinks this way and ends up not raising their hand whenever they have questions because of fear of being alienated. Pluralistic ignorance of competition can be measured through questionnaires evaluating the gap between personal comfort levels with competition and the perceived comfort levels of others with competition [9].

There are four potential conditions regarding pluralistic ignorance in the domain of competition: personally uncomfortable, perceives others uncomfortable; personally uncomfortable, perceives others comfortable; personally comfortable, perceives others comfortable; and personally comfortable, perceives others uncomfortable. To study involution, I focus on the condition when students personally feel uncomfortable about competition, but they perceived others as comfortable. I predict when students' personal comfort level with competition is low, their intrinsic motivation is likely to stay low. When students perceive others' comfort level of competition high, their extrinsic motivation will be high.

2.1.2. Involution

The combination of lower intrinsic motivation and higher extrinsic motivation defines involution. First, intrinsic motivation is the nature of an individual to desire success without the influence of external factors. It involves the desire for achievement and enjoyment of completing a task for its own sake [10]. For example, one desiring to eat an ice cream for the sake of eating an ice cream and tasting its flavor means that their intrinsic motivation for eating an ice cream is high. I define intrinsic motivation as involving task enjoyment [10] and task fulfillment. There is a positive correlation between intrinsic motivation and performance [10], which may suggest that higher intrinsic motivation may result in better performance.

Second, extrinsic motivation is the individual's desire for achievement propelled by external factors. Extrinsic motivation would increase if an individual's perception of others' comfort level with competition is high. Using the same example of wanting to eat an ice cream. If an individual decides to eat an ice cream not because they enjoy eating the ice cream for the sake of eating it but rather because their friends all bought ice cream and were enjoying it means that this individual's extrinsic motivation for wanting to eat an ice cream is high. I define extrinsic motivation as involving passive task completion and the desire for external awards.

2.1.3. Depression

I hypothesize the downstream consequence of involution to be negative. I measure students' depression status. A stable mental health status means people have no sudden mental disorders or stress-related emotional bursts resulting in a lack of energy or overwhelming energy. The main factor that determines stable mental well-being is an appropriate amount of stress that is in proportion to an individual's capabilities to handle stress. Once the amount of stress exceeds this management capability level, an individual will attain an unstable mental health status. For instance, if use eating an ice cream as a hypothetical replacement for completing a difficult or unenjoyed task, the more an ice cream that is not intrinsically desired is eaten, the more malfunction there will be in the body. This includes the risk of unstable physical well-being, feeling tired, and because the ice cream was undesired, negative feelings about the food itself (such as disgust or exhaustion). I predict that

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persistent involution will likely result in increased extrinsic motivation and decreased intrinsic motivation, and therefore result in higher depression levels. This will ultimately result in less stable mental well-being.

In sum, this paper explores the relationship between pluralistic ignorance and involution, as well as worsened depression status as the downstream consequence.

2.2. Methods and Procedures

I first created a survey to evaluate my hypothesis and exploratory variables. My hypothesis included the necessary evaluation of pluralistic ignorance scores, intrinsic and extrinsic motivation scores, and mental health status scores. My exploratory variable was a student's confidence levels in grades and performance. I then started to collect data online with a questionnaire completion time of around 3 minutes. After participants gave consent to start the study, they were directed to a series of survey questions. For a complete list of my questionnaire and pre-registered analysis plan, see items in supplementary materials and online repository (https://osf.io/4hmz6).

I measured pluralistic ignorance through questionnaires asking participants to rate their personal level of comfort with competition and their perceived level of comfort of others on a scale from 1 to 5. One example item is: "How comfortable are you with academic competition?"

I measured intrinsic and extrinsic motivation through questionnaires asking personal task enjoyment and task fulfillment through ratings on a scale from 1 to 5. One example item for extrinsic motivation is: "How often would you complete a required task?" One example item for intrinsic motivation is: "How much do you enjoy completing such a task?"

I measured mental health status with self-assessment questionnaires. Participants were asked to answer the following questions referring to the Patient Health Questionnaire-9 (Kurt Kroenke). One example item is: "Feeling bad about yourself — or that you are a failure or have let yourself or your family down?"

Finally, participants indicated their confidence in their performances and grades using a scale from 1 to 5.

I recruited 313 middle school and high school students from mainland China online. There were 42% male students, 53% female, and 5% prefer not to say (Figure 1). In terms of students' age (Grades 7 through 12), there were 36% from Grade 8, 7% from Grade 7, and around 10% to 20% from each of other grades (Figure 2). For participants' geographic location, there were 30% from developed big cities such as Shanghai, Beijing, Shenzhen, and Guangzhou, 10% from cities with high rates of students taking college entry exams (Gaokao) including Guangdong-excluding Guangzhou, Hangzhou, Shandong, Henan, Hebei, Hunan, Anhui, Jiangxi, and Guizhou, and 60% from other cities. In terms of students' school type, 81% are from public schools, 14% are from private schools, and 5% are from other school types (Figure 3). For students' parents' education level, 35% graduated from elementary school and/or middle school, and 8% graduated from college with a Ph.D., and other education levels were between 10% to 20% (Figure 4).

DOI: 10.54254/2753-7048/14/20231000

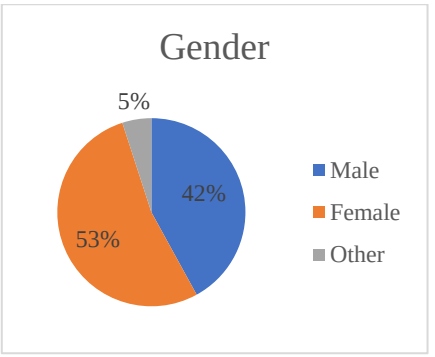

Figure 1: Gender distribution.

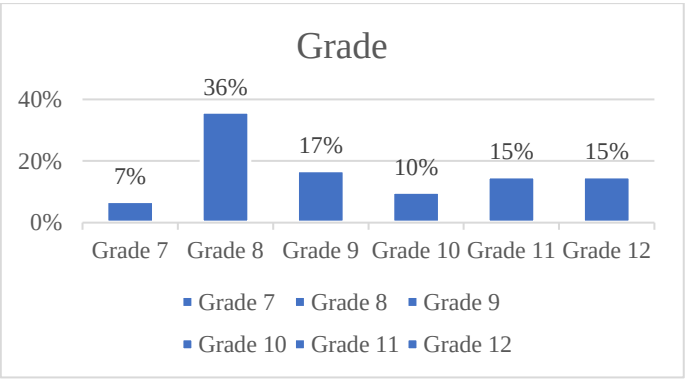

Figure 2: Grade distribution.

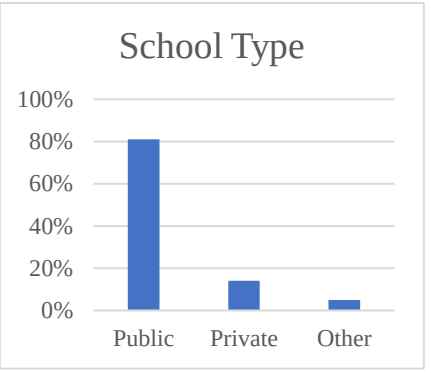

Figure 3: School type distribution.

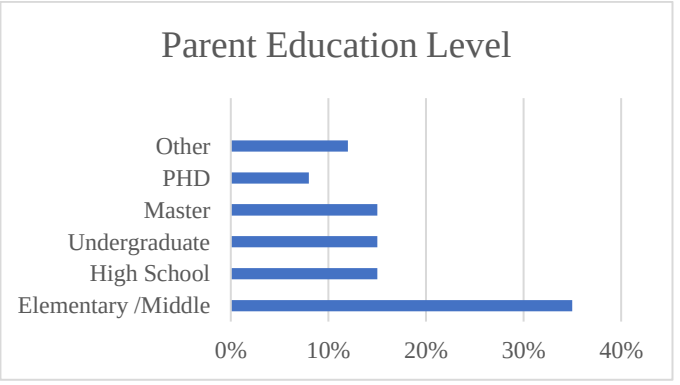

Figure 4: Parent education background.

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3. Results

3.1. Descriptive Analysis

My main independent variable is pluralistic ignorance, which is calculated as the difference score between how participants think they feel about competition (personal comfort levels) and how they think other students feel about competition (perceived comfort levels of others). As indicated by Table 1, the range of pluralistic ignorance is from -4 to 4, with an average score of .009, and standard deviation of 3.700. A score of 4 for pluralistic ignorance indicates a large difference between participant's personal comfort levels with competition and their perceived comfort level of competition of others, with personal greater than perceived. Vice versa, a score of -4 for pluralistic ignorance indicates perceived greater than personal.

Intrinsic motivation includes six aspects: task fulfillment and task enjoyment for each of the three types of tasks (required, optional, bonus-credit). Inter-item reliability test found task fulfillment and enjoyment strongly relate to each other (Cronbach' s alpha = .707). I therefore calculated intrinsic motivation using the mean of task fulfillment and task enjoyment.

I also ran Cronbach's alpha between extrinsic motivation scores for the three tasks and yielded 0.639; therefore, I calculated extrinsic motivation using the mean of extrinsic scores for required tasks, optional tasks, and bonus-credit tasks.

Finally, I calculated involution using the difference score between intrinsic and extrinsic motivation. The range of involution is from -4 to 4, with an average score of -0.004 and standard deviation of 0.683. A score of 4 for involution indicates a great difference between intrinsic and extrinsic motivation, with intrinsic greater than extrinsic, while a score of -4 for involution indicates extrinsic greater than intrinsic.

Mental health is composed of nine questions asking about depression severity. I ran Cronbach's alpha for these results and yielded a value of 0.874. This means that the score for the nine questions did not vary much for each participant; therefore, I calculated the mean of the nine questions to determine mental health status and for further calculation. The mean mental health score is 0.8638. The standard deviation for mental health is 1.7309. The range is from 1 to 4. A score of 1 for depression indicates little to no severity of depression symptoms, while 4 indicates high severity of depression symptoms.

Table 1: Variable information.

Variable	Definition	Range	Average	St. Deviation
Pluralistic Ignorance	The difference between personal comfort levels and perceived comfort levels of others	[-4,4]	0.009	3.7
Involution	The difference between Intrinsic and extrinsic motivation	[-4,4]	-0.004	0.683
Mental Health	The mean of the Kurt Kroenke 9 questions	[1,4]	0.8638	1.7309

3.2. Correlational Analysis

I have two main predictions: pluralistic ignorance correlates with involution, and involution correlates with depression. Regression.

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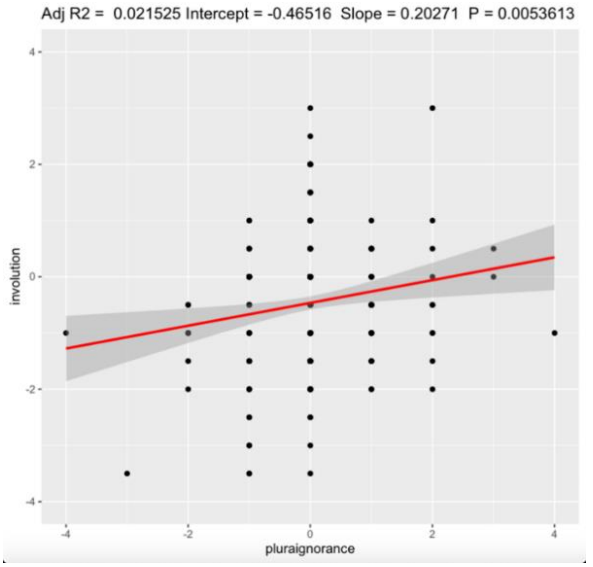

Figure 5: Correlation between pluralistic ignorance and involution.

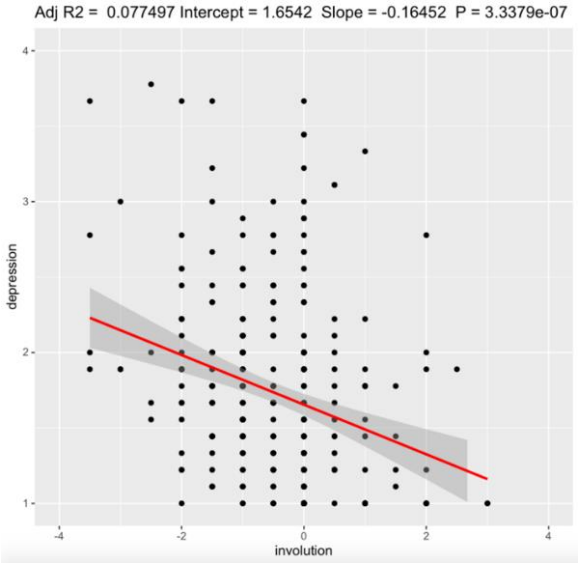

Figure 6: Correlation between involution and depression status.

To test, I first ran a linear regression with pluralistic ignorance as the independent variable and involution as the dependent variable. As predicted, pluralistic ignorance is positively correlated with involution – b = 0.202, 95% confidence interval [0.060, 0.344], t =2.804, p < 0.01 (Figure 5). This means that as the gap between how the students feel about competition and how they think others feel about competition increases, the gap between their intrinsic and extrinsic motivation also increases. For example, when students think they don't enjoy competition, but they think their classmates enjoy competition (i.e., high pluralistic ignorance), they tend to show high extrinsic motivation but less intrinsic motivation when completing a required task (i.e., high involution).

I also ran a linear regression with involution as the independent variable and depression status as the dependent variable. As predicted, involution is negatively correlated with depression status – b = -0.165, 95% confidence interval [-0.226, -0.102], t =-5.216, p < 0.001 (Figure 6). This means that as the intrinsic motivation decreases and extrinsic motivation increases, the larger the depression severity score. The negative coefficient supports my hypothesis as I determined involution as a higher

DOI: 10.54254/2753-7048/14/20231000

extrinsic and lower intrinsic motivation, resulting in a negative score for participants affected by involution. This indicates, that when students show high extrinsic but low intrinsic motivation (i.e., high involution), they tend to have a more severe depression status (i.e., high depression score).

3.3. Subgroup Analysis

In addition to my main analysis, I also explored the relationship among people from different demographic groups.

Indicated by Table 2 and 3, students' grades (grade 7 to 12) may matter. I ran a linear regression with involution and participant's grade as the independent variable, and depression status as the dependent variable. I used grade 7 as the baseline for participant's grade and score 0 as the baseline for involution (i.e., no difference between intrinsic and extrinsic motivation for competition). I found statistically significant difference in involution between participants' grade (b = 0.051, 95% confidence interval [0.003, 0.099], t = 2.111, p = 0.035), meaning the involution score (the difference between intrinsic motivation and extrinsic motivation) increases (larger negative magnitude) as students' grade increases. This means that older students (i.e., higher grade) show worse depression status (i.e., high depression scores)

School type may matter. I also ran a linear regression with pluralistic ignorance and participant's school type as the independent variable, involution as the dependent variable. I used public school as the baseline for school type and score 0 as the baseline for pluralistic ignorance (i.e., no difference between self and perceived comfort level with competition). I found statistically significant difference in involution between students who go to public schools with students who go to private schools (b = -0.418, 95% confidence interval [-0.545, -0.290] t=-6.448, p=4.4e-10; b2 = -0.464, 95% confidence interval [-0.799, -0.129] t=-2.726, p=0.006). Other school types did not differ from public schools in terms of students' levels of involution – b = 0.418, 95% confidence interval [-0.162, 0.998] t= 1.418, p=0.157. This means that participants from private schools, are significantly different from participants from public schools in terms of involution, meaning that students at private schools have a lower comparative intrinsic motivation and a higher comparative extrinsic motivation relative to that of students at public schools.

Parents' levels of education may matter. I ran a linear regression with pluralistic ignorance and participant's parent's education levels as the independent variable, involution as the dependent variable. I used elementary and middle-school as the baseline for parents' education and score 0 as the baseline for pluralistic ignorance (i.e., no difference between self and perceived comfort level with competition). I found a statistically significant difference in involution between students whose parents graduated with a master's degree with students whose parents graduated from elementary and/or middle school, b = -0.657, 95% confidence interval [-1.024, -0.290] t=-3.573, p=0.0004. Other levels of education did not differ from elementary and/or middle school in terms of students' levels of involution. In addition, I found the relationship between pluralistic ignorance and involution is different for students whose parents graduated with a master's degree versus those from elementary and/or middle school, b = 0.484, 95% confidence interval [0.038, 0.930], t=2.138, p=0.033.

This means that participants with parents who graduated with a master's degree, are significantly different from participants with parents who graduated from elementary and/or middle school in terms of involution, meaning that students with parents who graduated with a master's degree have a lower comparative intrinsic motivation and a higher comparative extrinsic motivation relative to that of students with parents graduated from elementary and/or middle school. This also means that for participants with parents graduating with a master's degree, they show an even stronger relationship between pluralistic ignorance and involution than students whose parents graduated from middle/elementary school. For example, students from master's degree families think they really don't enjoy competition, but they think their classmates really enjoy competition (the magnitude of

DOI: 10.54254/2753-7048/14/20231000

this difference is greater than other categories), so they tend to show higher extrinsic motivation but lower intrinsic motivation when completing a required task (i.e., high involution), as compared to students whose parents graduated with elementary and/or middle school.

Table 2: Scores of average student's pluralistic ignorance with comfort levels of academic competition.

Measure	Self	Perceived Average
Grade		
7	3.89	3.76
8	3.79	3.85
9	3.76	3.71
10	3.48	3.39
11	3.40	3.46
12	3.57	3.63
School type		
Public	3.70	3.73
Private	3.70	3.39
Parent's Education Level		
Elementary/Middle School	3.75	3.77
High School	3.78	3.81
Bachelor's Degree	3.69	3.72
Master's Degree	3.52	3.36
Ph.D.	3.68	3.64

Table 3: Scores of average student's involution.

Measure	Self	Perceived Average
Grade		
7	3.77	3.93
8	3.63	3.58
9	3.81	3.63
10	3.72	3.61
11	3.64	3.92
12	3.63	3.70
School type		
Public	3.68	3.65
Private	3.59	3.89
Parent's Education Level		
Elementary/Middle School	3.60	3.53
High School	3.78	3.66
Bachelor's Degree	3.78	3.79
Master's Degree	3.55	3.86
Ph.D.	3.78	3.83

I ran a linear regression with involution and participant's parent's education levels as the independent variable and depression status as the dependent variable. I used elementary and middle-school as the baseline for parents' education and score 0 as the baseline for involution (i.e., no

DOI: 10.54254/2753-7048/14/20231000

difference between intrinsic and extrinsic motivation for competition). I also found statistically significant difference in depression scores between students whose parents graduated with a master's degree with students whose parents graduated from elementary and/or middle school, b = -0.246, 95% confidence interval [-0.492, -0.0006] t=-1.973, p=0.049, as shown through Table 3 and 4.

This means that participants with parents graduated with a master's degree, are significantly different from participants with parents graduated from elementary and/or middle school in terms of depression status, meaning that students of with parents graduated with a master's degree have a higher depression score relative to that of students with parents graduated from elementary and/or middle school. Other levels of education did not differ from elementary and/or middle school in terms of students' depression status. I found no statistically significant difference in depression scores between participants' parent's education levels (b = -0.037, 95% confidence interval [-0.087, 0.012], t=-1.466, p=0.144), meaning the depression score is similar across students of different education levels.

Table 4: Scores of average student's depression status.

Measure	
Parent's Education Level	
Elementary/Middle School	1.81
High School	1.69
Bachelor's Degree	1.69
Master's Degree	1.70
Ph.D.	1.66

For my exploratory variable, confidence in performance, I also ran a linear regression with involution as the independent variable and depression status as the dependent variable. I did not find a significant correlation between confidence levels and involution scores (meaning having a higher involution score did not necessarily indicate a lower confidence in performance and grades), but I did find a negative correlation between confidence levels and mental health status. This indicates that a greater depression score (worse severity), the less confidence students have for their performance and grades.

3.4. Case Study

I studied three example participants who showed extremely high depression scores.

Case study 1. I studied a female participant of grade 10 from a public school in Beijing who has a mean mental health score of 3.78 (mental health score ranges from 1 to 4), meaning this participant has very severe depression status and is struggling greatly with her mental health. Her intrinsic (2.67) and extrinsic (2.89) motivation are both low, with her extrinsic motivation higher than intrinsic motivation (involution). Her parents graduated with a master's degree. Her confidence with her grade and performance is 1 (ranging from 1 to 5), meaning this participant has no confidence with her grade and performance.

Case study 2. I studied a female participant of grade 12 from a public school who has a mean mental health score of 3 (mental health score ranges from 1 to 4), meaning this participant has severe depression status and is struggling with her mental health. Her intrinsic (2) and extrinsic (2) motivation were equal and both very low, meaning she does not have much interest and motivation in completing tasks. Her parents graduated with a bachelor's degree. Her confidence in her grade and performance is 3.5 (ranging from 1 to 5), meaning this participant has some confidence with her grade and performance.

DOI: 10.54254/2753-7048/14/20231000

Case study 3. I studied a male participant of grade 9 from another school type in Shanghai who has a mean mental health score of 2.78 (mental health score ranges from 1 to 4), meaning this participant has somewhat severe depression status but is struggling comparatively less with his mental health. His intrinsic (4.33) and extrinsic (4) motivation differs greatly, with very high extrinsic motivation but an even higher intrinsic motivation, meaning he has great interest and motivation in completing tasks. His parents graduated. His confidence with her grade and performance is 5 (ranging from 1 to 5), meaning this participant has very high confidence with his grade and performance.

These case studies indicate a potential pattern that for students with severe depression statuses, those with higher extrinsic and intrinsic motivations have higher confidence in their grade and performance.

4. Conclusion

The study reports a psychological mechanism, pluralistic ignorance, for persistent involution and worsened mental health among Chinese adolescents. The results suggest further research to be done to better understand the role of the mechanism pluralistic ignorance in involution, as well as methods that can effectively intervene with involution.

I found that pluralistic ignorance correlated with involution, meaning that when students think they don't enjoy competition, but they think their classmates enjoy competition (i.e., high pluralistic ignorance), they tend to show high extrinsic motivation but less intrinsic motivation when completing a required task (i.e., high involution). I also found that involution is correlated with depression status, meaning that when students show high extrinsic but low intrinsic motivation (i.e., high involution), they tend to have a more severe depression status (i.e., high depression score). Taken together, these findings support my hypothesis that pluralistic ignorance is a factor resulting in the persistence of involution and a worsened mental health.

5. Discussion

These results indicate that apart from job market exploitation and homogeneity, there is a third explanation that results in involution's long-term appearance. Pluralistic ignorance, a psychological mechanism, is positively correlated with involution, meaning that future efforts to eliminate negative consequences of involution may also take pluralistic ignorance into account. For example, education policies and educators can reference these results and design policies that are more effective at resolving negative consequences of involution. Clinics providing psychotherapy can also refer this as depression severity is correlated with involution, meaning therapy strategies for depression can approach new realms of discovery. The results can make great contributions to both educational and psychological fields.

Pluralistic ignorance and involution's correlation may not suggest causation. To verify the causal link between these two factors, one could attempt to manipulate pluralistic ignorance—through altering the environment or the population size—and observe the effects on involution. Specifically, for environment, an experiment could create a designated environment that fits participants' perception (meaning that personal comfort levels of competition will equal perceived comfort levels of competition of others), thereby minimizing misperception. Secondly, for population size, misperception may be positively corelated with how many people a person is in contact with, as the larger the population size, the greater the effect of pluralistic ignorance is into play (e.g., there may not be a lot of misperceptions between two individuals interacting with one another). Therefore, a second potential experiment could measure whether population size affects the severity of misperception and evaluate whether changing the population size could intervene with involution. These are worthy proposals to consider for future research. Additionally, the sample size of this study

DOI: 10.54254/2753-7048/14/20231000

may be small and unrepresentative of the society in general, so further research could be done with a larger sample size in different demographic groups (e.g., working adults).

The results may only be generalized to students from grade 7 to 12 from mainland China, though similar results may likely be yielded from other student populations. Involution is perhaps not unique to China. For example, in American colleges, students' study for a higher GPA. In companies across the world, employees work for promotion and higher wages. More research could also be done on other consequences of involution, such as, creativity, socializing, time management, sleep schedule and quality, etc. apart from a worsened mental health.

Acknowledgements

I would like to appreciate and express my gratitude to my teacher, LiYan, who has provided me with extremely helpful advice and feedback throughout the process of research and paper writing. She has given me full support and shared her experience with me, helping me improve substantially and learn more than I could ever have in this area. I hope there will be a substantial number of opportunities to work with her in the future and motivate each other to dive further into the realm of the psychology of involution and the mental health of teenagers.

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