Effects of Mindset and Achievement—Comparison Style on Subjective Happiness

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Abstract

Researchers have examined how individuals' preferred ways of comparing achievements differ according to their mindset. However, studies investigating the concomitant impact of such differences on individuals' happiness are relatively scant. Using a variety of scenarios, the present study examined how fixed-mindset and growth-mindset individuals' different achievement-comparison styles (more than others, less than others, better than before, and worse than before) affected their subjective happiness. A total of 880 participants were recruited. Fixed-mindset individuals felt happy when they felt they achieved more than others and unhappy when they felt the opposite, but were not influenced significantly when their achievement was better or worse than before. Conversely, growth-mindset individuals felt happy when their achievement was better than before but unhappy when it was the opposite, without being influenced significantly by achieving more or less than others. This study examined mindset, achievement comparison, and subjective happiness comprehensively, which, to date, have only been examined independently.

Key words: Growth Mindset, Fixed Mindset, Achievement Comparison Type, Subjective Happiness, Attitude

1. INTRODUCTION

Even after reaching similar milestones, individuals may show different emotional responses to their achievements (Burnette et al., 2020; Han & Stieha, 2020). Consider two individuals, Kim and Lee, who both received a B in their psychology course and subsequently heard about Choo, who received a C. Kim felt happy after hearing the news, while Lee did not show any emotional reaction. Such differences in their response to the same situation can be explained by the difference in Kim's and Lee's attitudes (Dweck & Yeager, 2019).

Specifically, Kim is satisfied when she outperforms others but dissatisfied when she underperforms compared with her peers. Therefore, she was pleased when she heard that Choo received a lower grade than she did. Conversely, Lee's satisfaction depends on whether her own performance has improved compared to the past, so the news about Choo's grade did not have a significant emotional impact on Lee. Now, the question is why have Kim and Lee developed such different perspectives in judging their achievements?

The mindset theory has provided psychological insights into this question (Dweck, 2012). The term "mindset" refers to an individual's perspective related to their belief in the possibility of change and the growth of talent through effort (Dweck, 2017).

Mindsets can be broadly categorized into fixed and

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growth types. Fixed-mindset individuals believe that their talents are predetermined and difficult to change through effort (Choi, 2019; Dweck, 2012). Consequently, an individual with a fixed-mindset perceives success as a result of innate abilities rather than hard work, and they believe that effort is only necessary for those who lack natural talent (Dweck, 2006). Conversely, growth-mindset nurture the belief that their academic and social challenges can potentially be improved (Yeager & Dweck, 2012). For this reason, growth-mindset individuals believe that their talents can be developed through effort (Choi & Oh, 2018; Dweck, 2017).

Researchers have examined the differences between fixed and growth mindsets (Choi, 2019; Dweck, 2017). When facing difficulties, fixed-mindset individuals tend to believe they do not have the talent to overcome such challenges and are more likely to give up (Dweck, 2012; Mercer & Ryan, 2010). Conversely, growth-mindset individuals tend to view difficulties as resulting from a lack of effort and are more likely to persist and eventually overcome such barriers (Dweck, 2016; Mercer & Ryan, 2010). Fixed-mindset individuals see failure as a lack of talent and are frustrated by it (Dweck & Yeager, 2019), whereas growth-mindset individuals view failure as a process of trial-and-error and a learning experience and are motivated to strive further (Dweck, 2017). Further, fixed-mindset individuals are interested in whether their abilities are superior to others (Chan, 2012; Choi & Oh, 2018). By contrast, growth-mindset individuals are concerned about whether their abilities are improving over time (Choi, 2019; Choi & Oh, 2018).

From this perspective, Kim, in the earlier example, likely has a fixed mindset, whereas Lee likely has a growth mindset (Hwang et al., 2019; Richardson et al., 2021). Hence, Kim is concerned about whether Choo's grade is lower or higher than hers, whereas Lee is more focused on the improvement of her own grades (Hwang & Lee, 2018; Ng, 2018). However, previous studies have

been limited in their scope. No past study has explored whether fixed-mindset individuals become happier when they feel satisfied with their talents after witnessing others who have achieved less (or, conversely, become unhappy when they encounter someone who has achieved more than them). Similarly, there is also a lack of studies explaining whether growth-mindset individuals are happier when they improve/achieve more (or become unhappy when they do not improve compared to the past).

In this context, the present study aims to complement the shortcomings of prior research and contribute to this field by experimentally exploring whether individuals' level of happiness varies according to their mindset and achievement-comparison style. In other words, we observed whether happiness in fixed-mindset individuals varies depending on their level of achievement, compared with that of their peers. Additionally, we observed whether happiness in growth-mindset individuals varies depending on their degree of improvement, compared to their past selves.

1.1. Mindset and Achievement-Comparison Styles

An individual's mindset is closely linked to their preferred achievement-comparison style (Dweck, 2012). For people with a fixed mindset, they perceive the risks or the efforts they encounter as revealing their own incompetence, and they believe it proves that they are not the right person for the task (Dweck, 2012). Fixed-mindset people tend to define achievement as a state of superiority compared to others (Dweck, 2017). Hence, they are highly likely to feel a sense of achievement in situations that allow for downward comparisons and feel a sense of inferiority in situations that force them to make upward comparisons (Choi, 2019).

On the other hand, a person with a growth mindset does not easily label themselves and give up. Even when

faced with major setbacks in the process towards achievement, they are prepared to take risks and consistently push forward (Dweck, 2012). Therefore, growth-mindset people define achievement as the improvement of their own competencies and mastery of their learning. Therefore, they may not attach significance to downward comparisons with others (Dweck, 2016).

In one study, the researchers provided the participants with an opportunity to check the results of either a person who scored lower or higher than themselves on the final exam (Choi, 2019; Choi & Oh, 2018). Said study found that fixed-mindset individuals tended to choose to view the results of peers who scored lower, whereas growth-mindset individuals tended to choose to view the results of peers who scored higher.

This phenomenon arises as fixed-mindset individuals strive to experience a sense of superiority and an augmentation of self-esteem by observing others whom they perceive as less talented (Choi, 2019; Dweck, 2012). In contrast, growth-mindset individuals purposefully seek to identify areas of personal development by reviewing the results of peers who outperformed them. In other words, growth-mindset individuals engage in upward comparison as a means to stimulate their own growth, without necessarily tethering it to their self-esteem or overall happiness (Choi, 2019).

1.2. Mindset, Achievement-Comparison Styles, and Subjective Happiness

Prior studies on social comparison and well-being have shown that there are people who derive happiness from downward comparisons and those who do not (Lee, 2019; Lyubomirsky & Ross, 1997). In light of these findings, it is highly likely that mindset, which influences one's preferred achievement-comparison style, is also linked to individuals' happiness. Studies showing that

individuals embracing a growth mindset tend to evaluate their achievements more positively than those with a fixed mindset and are happier also highlight the likelihood of a link between mindset, achievement- comparison style, and happiness (Chan, 2012; Hwang et al., 2019).

Moreover, some studies have emphasized the strong correlation between mindset and variables frequently associated with happiness, such as frustration and resilience (Dweck, 2012; 2016). First, fixed-mindset individuals often succumb to a sense of helplessness in the face of failure, perceiving it as an enduring emotional wound (Choi, 2019; Hochanadel & Finamore, 2015). Consequently, they are more prone to unhappiness when confronted with situations that expose their inferiority to others. Conversely, growth-mindset individuals tend to view failure as an invaluable avenue for learning, personal development, and maturation (Choi & Oh, 2018). Consequently, they are unlikely to suffer substantial repercussions on their overall happiness even if placed in a situation revealing their inferior competency compared to others.

Furthermore, fixed-mindset individuals exhibit a tendency to seek out individuals with less achievements than themselves to experience a sense of relative superiority, thus striving to augment their happiness through such comparisons (Dweck & Yeager, 2019). This indicates they are likely to experience an increase in happiness when they compare themselves with peers with inferior achievements (downward comparison) but a decrease in happiness when they compare themselves with peers with superior achievements (upward comparison) (Dweck, 2012; 2017). In contrast, growth-mindset individuals focus on assessing whether they have improved over time and use this as the basis for their satisfaction. Thus, downward or upward comparison is unlikely to have an impact on their happiness (Choi & Oh, 2018). Instead, growth-mindset individuals are pre-

dicted to feel heightened levels of happiness when they show improvement over time, and, conversely, lower levels of happiness when they exhibit a decrement compared to previous achievements (Choi, 2019). Based on this theoretical framework, this study will test four hypotheses:

- Hypothesis A: Fixed-mindset individuals will have higher subjective happiness if they achieve more than their peers vs. if they achieve less.
- Hypothesis B: Fixed-mindset individuals will show no difference in their subjective happiness depending on whether they improve over time.
- Hypothesis C: Growth-mindset individuals will show no difference in their subjective happiness depending on whether they achieve more or less than their peers.
- Hypothesis D: Growth-mindset individuals will have higher subjective happiness if they have improved over time vs. if they have not improved.

If these four hypotheses are valid, the interaction between mindset and achievement comparison method should have an impact on subjective happiness.

2. METHOD

2.1. Design and Participants

A between-subjects factorial design was used to examine the effects of two types of mindsets (fixed vs. growth) × four achievement-comparison styles (more than others vs. less than others vs. better than before vs. worse than before) on subjective happiness. A total of 880 undergraduate students (340 male, 540 female), aged 19–24 years, from Gyeonggi Province in South Korea were recruited for the study. The participants were enrolled in general education (GE) and advanced psychology courses, were all Korean nationals, and were native Korean speakers. The participants were given an experiment participation score.

2.2. Materials

For the study, scenarios (comparing one's achievements with others' and comparing one's achievements over time), subjective happiness scale, and mindset scale were used. First, two scenarios were developed to present a situation in which individuals compared their achievements with others' achievements. Specifically, in a scenario in which others' achievements were better than the participants', the following prompt was presented: 'Imagine how you would feel if the following events happened to you. Moreover, try to recall if you have had similar experiences in the past. In a final presentation for a major course, you scored 6 out of 10 points, whereas everyone you know received a score of 8. Additionally, in a final report for a GE course, you scored 3 out of 5 points, whereas everyone you know received a score of 4.' In a scenario in which others' achievements were less than the participants', the following prompt was presented: 'Imagine how you would feel if the following events happened to you. Moreover, try to recall if you have had similar experiences in the past. In a final presentation for a major course, you scored 8 out of 10 points, whereas everyone you know received a score of 6. Additionally, in a final report for a GE course, you scored 3 out of 5 points, whereas everyone you know had a score of 3.'

Next, two scenarios were developed to present a situation in which individuals compared their achievements over time. Specifically, in the scenario where participants' current achievements were superior to their past achievements, the following prompt was presented: 'Imagine how you would feel if the following events happened to you. Moreover, try to recall if you have had similar experiences in the past. In a final pre-

sentation for a major course, you scored 8 out of 10 points, which is an improvement from your score of 6 for the midterm presentation. Additionally, in a final report for a GE course, you scored 4 out of 5 points, which is an improvement from your score of 3 in the midterm report.' In a situation in which participants' current achievements were inferior to their past achievements, the following prompt was presented: 'Imagine how you would feel if the following events happened to you. Moreover, try to recall if you have had similar experiences in the past. In a final presentation for a major course, you scored 6 out of 10 points, which is a decline from your score of 8 for the midterm presentation. Additionally, in a final report for a GE course, you scored 3 out of 5 points, which is an improvement from your score of 4 in the midterm report.'

Subjective happiness was measured using the four items developed by Lyubomirsky and Lepper (1999) (α = .75). In this study, we defined subjective happiness as the average score of these four items. The scale consists of items such as 'In general, I consider myself a happy person; Some people are generally very happy, and I am one of them.' The scale's internal consistency (Cronbach's α) in our study was high, at .79.

Participants' mindset was assessed using the eight items developed by Dweck et al. (1995) (α = .77). In this study, we defined mindset as the average score of these eight items. The scale includes items such as 'Regardless of intelligence level, intelligence can be improved substantially anytime; I can always change my intelligence level with hard work.' The scale's internal consistency for our study was high, at .98.

2.3. Procedure

During the experiment, the participants flipped through printed pages one by one. On the first page, participants were randomly assigned to one of four scenar-

ios: a scenario where others' achievements were better than those of the respondents, a scenario where others' achievements were worse than the respondents, a scenario where participants' achievements had improved over time, and a scenario where their achievements had decreased over time. After imagining the situation presented in the scenario and how they would feel, the participants turned to the second page and responded to the seven-point Subjective Happiness Scale (1: "strongly disagree"; 7: "strongly agree"). On the third page, participants responded to the seven-point mindset survey (1: "strongly disagree"; 7: "strongly agree"). Participants completed the instruments at their own pace and, on average, took approximately 10 minutes to complete them all.

3. RESULTS

A two-way ANOVA was performed to examine the effects of two types of mindsets (fixed vs. growth) × four achievement comparison styles (more than others vs. less than others vs. better than before vs. less than before) on subjective happiness. The fixed-mindset group consisted of participants with a mindset score below -1 SD from the mean (n = 152), whereas the growth-mindset group consisted of participants with a mindset score above +1 SD from the mean (n = 156). Table 1 summarizes the descriptive statistics derived from this analysis.

Mindset did not have a significant main effect on subjective happiness (F = 1.279, p = .259). That is, the fixed-mindset (M = 4.13, SD = 1.35) and growth-mindset (M = 4.16, SD = .96) groups did not differ in their subjective happiness. Next, achievement-comparison style had a significant main effect on subjective happiness (F(3, 300) = 297.123, p < .001, η_p^2 = .75). More specifically, subjective happiness was higher when they

Table 1. Summary of descriptive statistics

DV: Subjective Happiness		Mindset		All
		Fixed (below -1 SD)	Growth (above +1 SD)	
		M (SD)	M (SD)	M (SD)
Comparison style	Achieved more than others	5.97 (.43)	4.06 (.38)	5.00 (1.04)
	Achieved less than others	2.43 (.52)	4.07 (.40)	3.26 (.94)
	Better than before	3.90 (.40)	5.45 (.52)	4.69 (.91)
	Worse than before	4.07 (.43)	3.03 (.38)	3.54 (.66)
All		4.13 (1.35)	4.16 (.96)	4.14 (1.16)

achieved more than others (M = 5.00, SD = 1.04) and when their achievement improved over time (M = 4.69, SD = .91).

Moreover, there was a significant two-way interactive effect of mindset and achievement comparison type on subjective happiness (F(3, 300) = 333.403, p < .001, η_p^2 = .77). Fig. 1 illustrates this two-way interaction. This interaction is relevant to the hypotheses of this study, and it should be examined in four separate conditions. First, for the fixed-mindset group, subjective happiness was higher when they achieved more than others (M = 5.97, SD = .43) than when they achieved less than others

(M = 2.43, SD = .52) (t(75) = 32.705, p < .001). This supports hypothesis A. Second, in the fixed-mindset group, there was no difference in subjective happiness between the scenario where achievement was better than before (M = 3.90, SD = .40) and the scenario where achievement was less than before (M = 4.07, SD = .43) (t(73) = 1.798, p = .076). This supports hypothesis B.

Third, in the growth-mindset group, there was no significant difference in subjective happiness between the scenario where participants' achievement was better than others (M = 4.06, SD = .38) and the scenario where their achievement was less than others (M = 4.07, SD
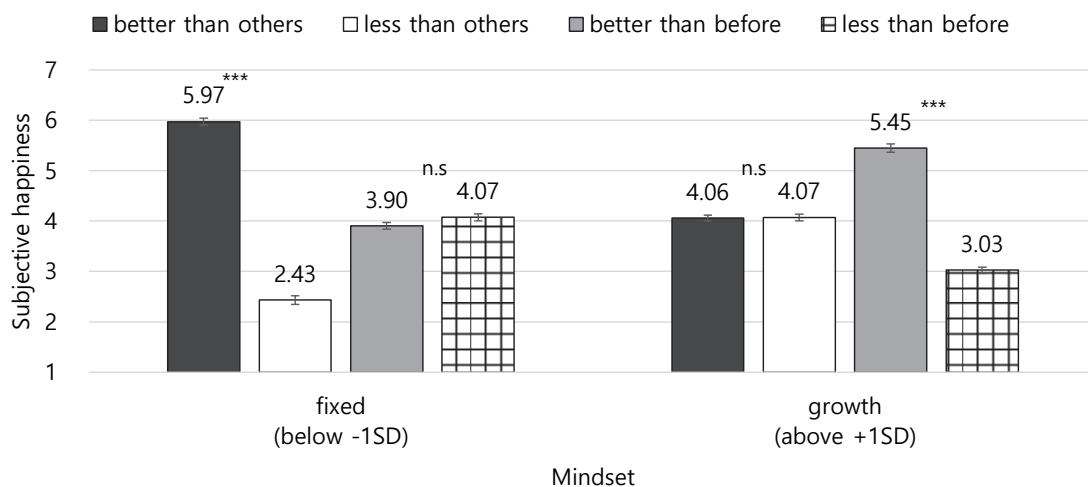

Fig. 1. Two-way interaction between mindset and achievement-comparison style. Error bars indicate the standard error of the means. ***: p < .001, n.s: p > .05

= .40) (t (77) = .055, *p* = .957). This supports hypothesis C. Fourth, in the growth-mindset group, subjective happiness was higher when achievement was better than before (M = 5.45, SD = .52) than when it was less than before (M = 3.03, SD = .38) (t(75) = 23.194, *p* < .001). This supports hypothesis D. As shown here, all four hypotheses of the study were supported.

4. DISCUSSION

This study aimed to observe the effects of individuals' mindset and achievement-comparison style on their subjective happiness. To this end, we divided the participants into fixed-mindset and growth-mindset groups, had them read four different achievement-comparison scenarios, and measured their subjective happiness.

Consequently, there was no difference in the overall level of subjective happiness depending on the mindset. The results for the hypothesis are as follows: The fixed-mindset participants were happy when they felt they were better than others but were unhappy when they did not (Hypothesis A). Furthermore, their subjective happiness was not influenced by whether their achievement was better or less than before (Hypothesis B). Next, the subjective happiness of the growth-mindset participants was not influenced by whether their achievement was better or less than others (Hypothesis C). However, these participants were happy when their achievement was better than before and unhappy when it was the opposite (Hypothesis D).

The fact that happiness in the fixed-mindset group was influenced by their comparisons with other people can be explained by their attitude (Dweck, 2000; 2016). More specifically, the fixed-mindset group defined achievement as being superior to others and having a higher socioeconomic status than others. Such attitude causes them to be dissatisfied when they achieve less than oth-

ers and when their socioeconomic status drops below that of others, eventually making them unhappy. This is the phenomenon we observed in this study.

The fact that happiness in the growth-mindset group was influenced by their comparisons with their own achievements in the past can also be explained from this perspective (Dweck, 2000, Choi, 2019). This group defines achievement as an enhancement of competence or mastery of knowledge or skills (Boaler, 2002; Claro et al., 2016). Such attitude makes them dissatisfied in situations in which they feel that their competence has not improved or they have not mastered their knowledge or skills, which makes them unhappy. This is the phenomenon we observed in this study.

Moreover, fixed-mindset individuals are known to become obsessed with their errors and experience more severe frustrations when they have achieved less than other people (Burnette et al., 2020; Dweck, 2016). These are probably the emotions that the fixed-mindset participants in our study felt while reading the scenario in which their achievements were less than those of other people and when recalling similar situations in their past (Boaler, 2016). Conversely, growth-mindset individuals are known to quickly recover from the short-lived frustration they feel when they learn their achievement decreased over time (Burnette et al., 2022; Dweck, 2017). These are probably the emotions that the growth-mindset participants in our study felt while reading the scenarios in which their achievements were less than their past achievements and when recalling similar situations in the past (Boaler, 2016).

5. IMPLICATIONS

This study is significant as it comprehensively examined factors that have only been studied separately in the past, namely, mindset and achievement-comparison

style (Han & Stieha, 2020), as well as the link between achievement comparison and happiness (Lyubomirsky & Ross, 1997). Specifically, previous studies have shown that fixed-mindset individuals prefer downward comparisons, as they make them feel happier. Similarly, we showed that fixed-mindset people become happy when they engage in downward comparisons.

Additionally, our study offers valuable insights by experimentally confirming that growth-mindset individuals are interested in improving their accomplishments and competence. Although previous studies have confirmed that growth-mindset individuals aim to improve their competence, they could not determine how such an inclination influences their achievement-comparison styles (Burnette et al., 2020, Yeager & Dweck, 2020). This study contributes to the literature by showing that growth-mindset individuals, who prioritize personal growth, are concerned about whether their achievements have improved over time, and that their happiness can vary accordingly.

Moreover, this study is significant because it examined the causal relationships among mindset, achievement-comparison style, and happiness in a laboratory setting. While prior studies have explored the association between mindset and happiness (Chan, 2012), they were unable to explain the reason underlying their association or the causal relationships between the variables. However, this study addressed such limitation by experimentally confirming that an individual's attitude—i.e., their mindset—interacts with their achievement-comparison style and influences their happiness.

6. LIMITATIONS AND RECOMMENDATIONS

Despite its valuable contributions, this study had some limitations that should be addressed in future studies.

First, we only enrolled undergraduate students in their 20s, so the findings of this study may not be generalized to other age groups. However, mindset has been researched across various age groups in the past, while consistent results have been reported; thus, the limited age range of our participants should not undermine the generalizability of our findings (Dweck & Yeager, 2019).

Next, our results do not provide conclusive evidence to determine whether fixed-mindset individuals would increase their efforts or give up in response to the disappointment they feel after recognizing their inferior achievements compared to others. Further research is needed to explore how effort intentions, practice intentions, and reattempt intention change according to individuals' mindset and achievement-comparison styles. Moreover, our findings do not clarify whether growth-mindset individuals recover more quickly from the disappointment resulting from inadequate achievements, compared with fixed-mindset individuals who feel disappointed due to the same situation. To examine this, longitudinal studies that measure how happiness evolves over time after disappointment-inducing situations are needed.

Furthermore, it is difficult to predict how the emotional responses of fixed-mindset individuals and growth-mindset individuals differ in situations where they have objectively made significant achievements, while their peers have comparatively better achievements, based solely on our study. For instance, will a person who scored 95 on a 100-point exam be delighted with their high achievement, or will they be disappointed that their classmate scored 100? Additional research in this area could broaden scholarly understanding of mindset and achievement.

REFERENCES

Boaler, J. (2002). *Experiencing school mathematics: Traditional and reform approaches to teaching and their impact on student learning.* Routledge.

Boaler, J. (2016). *Mathematical mindsets: Unleashing students' potential through creative math, inspiring messages and innovative teaching.* Jossey-Bass.

Burnette, J. L., Billingsley, J., Banks, G. C., Knouse, L. E., Hoyt, C. L., Pollack, J. M., & Simon, S. (2022). A systematic review and meta-analysis of growth mindset interventions: For whom, how, and why might such interventions work? *Psychological Bulletin.* Advance online publication. DOI: 10.1037/bul0000368

Burnette, J. L., Knouse, L. E., Vavra, D. T., O'Boyle, E., & Brooks, M. A. (2020). Growth mindsets and psychological distress: A meta-analysis. *Clinical Psychology Review*, *77*, Article 101816. DOI: 10.1016/j.cpr.2020.101816

Chan, D. W. (2012). Life satisfaction, happiness, and the growth mindset of healthy and unhealthy perfectionists among Hong Kong Chinese gifted students. *Roeper Review*, *34*(4), 224-233. DOI: 10.1080/02783193.2012.715333

Choi, J. (2019). The effect of a brain education-based personality program on self-directed learning: Fixed mindset, growth mindset, and academic self-efficacy. *Journal of Brain Education*, *23*, 69-104.

Choi, J., & Oh, M. (2018). A study on Carol Dweck's mindset studies. *Journal of Multimedia Services Convergent with Art*, *Humanities, and Sociology*, *8*(12), 139-147.

Claro, S., Paunesku, D., & Dweck, C. S. (2016). Growth mindset tempers the effects of poverty on academic achievement. *Proceedings of the National Academy of Sciences*, *113*(31), 8664-8668. DOI: 10.1073/pnas.160820711

Dweck, C. S. (2000). *Self-theories: Their role in motivation, personality, and development.* Psychology Press.

Dweck, C. S. (2006). *Mindset: The New Psychology of Success.* Random House.

Dweck, C. (2012). Mindset: *Changing the way you think to fulfil your potential.* Hachette UK.

Dweck, C. (2016). What having a "growth mindset" actually means. *Harvard Business Review*, *13*, 213-226.

Dweck, C. (2017). *Mindset-updated edition: Changing the way you think to fulfil your potential.* Hachette UK.

Dweck, C. S., & Yeager, D. S. (2019). Mindsets: A view from two eras. *Perspectives on Psychological Science*, *14*(3), 481-496. DOI: 10.1177/1745691618804166

Han, S. J., & Stieha, V. (2020). Growth mindset for human resource development: A scoping review of the literature with recommended interventions. *Human Resource Development Review*, *19*(3), 309-331. DOI: 10.1177/1534484320939739

Hochanadel, A., & Finamore, D. (2015). Fixed and growth mindset in education and how grit helps students persist in the face of adversity. *Journal of International Education Research*, *11*(1), 47-50. DOI: 10.19030/jier.v11i1.9099

Lee, G. (2019). The effect of interaction between subjective happiness and tendency to social comparison on the leisure intention of workers. *Journal of Leisure Studies*, *17*(3), 1-21. DOI: 10.22879/slos.2019.17.3.1

Lyubomirsky, S., & Lepper, H. S. (1999). A measure of subjective happiness: Preliminary reliability and construct validation. *Social Indicators Research*, *46*(2), 137-155. DOI: 10.1023/A:1006824100041

Lyubomirsky, S., & Ross, L. (1997). Hedonic consequences of social comparison: A contrast of happy and unhappy people. *Journal of Personality and Social Psychology*, *73*(6), 1141-1157. DOI: 10.1037/0022-3514.73.6.1141

Mercer, S., & Ryan, S. (2010). A mindset for EFL: Learners' beliefs about the role of natural talent. *ELT Journal*, *64*(4), 436-444. DOI: 10.1093/elt/ccp083

Ng, B. (2018). The neuroscience of growth mindset and intrinsic motivation. *Brain Sciences*, *8*(2), 20. DOI: 10.3390/brainsci8020020

Richardson, D., Kinnear, B., Hauer, K. E., Turner, T. L., Warm, E. J., Hall, A. K., Ross, S., Thoma, B., & Van Melle, E. (2021). Growth mindset in competency-based medical education. *Medical Teacher*, *43*(7), 751-757. DOI: 10.1080/0142159X.2021.1928036

Yeager, D. S., & Dweck, C. S. (2012). Mindsets that promote resilience: when students believe that personal characteristics can be developed. *Educational Psychologist*, *47*(4), 302-314. DOI: 10.1080/00461520. 2012.722805

Yeager, D. S., & Dweck, C. S. (2020). What can be learned from growth mindset controversies? *American Psychologist*, *75*(9), 1269-1284. DOI: 10.1037/amp 0000794