Relationship between Self-Esteem and Self-Consciousness in Adolescents: An Eye-Tracking Study

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Objective  Self-esteem and self-consciousness are important determinants of behaviors. This study aimed to explore the relationship between self-esteem and self-consciousness in adolescents using the eye-tracking measurement.

Methods  Fifty-five adolescents with high self-esteem and 58 adolescents with low self-esteem participated in self-consciousness-related eye-tracking experiments of selecting happy, disgusted, and angry facial emotions while recognizing one’s own usual expressions and the others’ usual expressions toward oneself.

Results  When recognizing one’s own, adolescents with high self-esteem showed significantly more selection counts and longer fixation time for ‘happy’ than adolescents with low self-esteem. When recognizing the others’, adolescents with low self-esteem showed significantly more selection counts and longer fixation time for ‘disgusted’ and ‘angry’ than adolescents with high self-esteem.

Conclusion  These suggest higher self-esteem is connected to more positive identification of one’s usual expressions and others’ usual expressions toward oneself. There is a close relationship among low self-esteem, suppressing positive emotions, decreased psychological adjustment, and increased negative emotions.

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Key Words  Self-esteem, Self-consciousness, Facial emotions, Eye-tracking, Adolescence.

INTRODUCTION

Adolescence is a transition period accompanied by physical, psychological, and social changes that cause emotional awakening, and thus it is a time when emotion regulation is the most challenging.1,2 Emotional experience in this period is stronger than in any time in life. Emotional control at this time is related to social and emotional development, academic achievement, attention-concentration, prosocial behavior, problem-solving ability, interpersonal quality, and physical health,3 and its problem is linked to maladaptive behaviors and maladjustment.4

Emotion is one of determinants of self-esteem. In particular, the specificity of adolescents’ attachment to parents and peers plays an important role in forming teenagers’ self-esteem.5 Adolescents with high self-esteem have positive feelings about their lives such as cheerfulness, vigor, sense of security, confidence in the future, and realistic expectation of self, whereas those with low self-esteem often feel emotionally depressed.6 Self-esteem is crucial to individuals’ psychological well-being, and the level of self-esteem can affect individuals’ sense of happiness in their lives.7

It has been considered that self-esteem has a consistent influence on the identity styles.8 Ideal self-esteem can be achieved through personal and subjective experiences, not by success in an external domain in which the eye of others is conscious.9 In terms of social identity theory, an individual’s healthy self-concept derives from the harmonious perception of independent personal self and interdependent self.10 Self-esteem is closely related to human relationships, and varies depending on how likely it is that one is rejected by another.11 People with high self-esteem tend to make interpersonal relationships
more pleasant by making cognitive beneficial interpretations even under negative circumstances, whereas those with low self-esteem are more likely to misinterpret events and to negatively affect the formation of interpersonal relationships.12

Given that emotion provides crucial information about the significance of social situations,13 being aware of one’s own and others’ emotions is essential for adapting to a social environment. Emotion awareness is the ability to recognize and appreciate the importance of emotions in oneself and others,14 and involves a willingness to face one’s own and others’ emotions.15 The ability to interpret and regulate one’s own emotions is an important factor in social adaptive behaviors.16 The ability to accurately perceive and respond to others’ emotions including facial expressions is also crucial for social adaptation and interpersonal relationships.17,18 Individuals with a clear perception of emotion tend to be more active in seeking social support and more satisfied with universal life.19,20 On the contrary, those who lack emotion awareness show more internalization problems such as depression and somatization.21

The relationship between emotion and self-esteem has been an interesting subject in the studies of the interpersonal relationship28 and the relationship between perceived norms and adaptive behavior.29 Self-consciousness has been considered to be an important factor in social adaptive behaviors.26,27 The ability to accurately perceive and respond to others’ emotions toward oneself between the high and low self-esteem adolescent groups. In this study, our hypothesis was that the high self-esteem group would more positively identify their usual facial expressions and also more positively evaluate others’ facial expressions, compared to the low self-esteem group.

METHODS

Participants
The Korean version22 of the Rosenberg self-esteem scale33 was administered to 573 second-year students (16 years old; 209 males and 364 females) in two high schools in South Korea to screen out a total of 60 male and 60 female adolescents in the upper and lower percentiles of the self-esteem scores. The scores ranged from 35 to 40 points (referred to as “High SE group”) and from 17 to 28 points (referred to as “Low SE group”), respectively, and corresponded to the upper and lower 13th percentiles in male adolescents and 8th percentiles in female adolescents. They were subjected to a behavioral experiment and the assessment of additional questionnaires. After excluding those with eyesight problems and with missing responses, a total of 55 male adolescents (27 in High SE group, 28 in Low SE group) and 58 female adolescents (28 in High SE group, 30 in Low SE group) were included in the analysis. This study has been approved by the local Institutional Review Board Committee (3-2014-0257), and all participants signed a written informed consent.

Psychological assessments
The Beck Depression Inventory (BDI),34 the Satisfaction with Life Scale (SWLS),35 and Basic Psychological Needs Scale (BPNS)36 were assessed to examine the level of depression, life satisfaction, and self-determination (autonomy, competence, and relatedness), respectively. The NEO Personality Inventory (NEO-PI-R)37 was applied to evaluate five personality traits (extraversion, agreeableness, openness, neuroticism, Conscientiousness). Meanwhile, to confirm that there is no group difference in the level of intelligence, the Raven’s Progressive Matrices (RPM)38 was assessed.

Behavioral tasks
We developed a self-consciousness task for eye-movement
tracking, in which an experimental stimulus of each trial was comprised of 6 strangers’ faces (Figure 1). The faces were those of happy male, disgusted male, angry male, happy female, disgusted female, and angry female, which were placed in a hexagonal position. They were presented for 5 seconds, and then replaced with boxes in the same position. The boxes were presented for 2 seconds for participants to respond using a corresponding button in the keyboard following the instruction. A fixation cross was followed for the stimulus interval of 0.5 seconds. There are two experiments according to the instructions, which were “Choose which picture resembles the most closely your usual facial expression” in the experiment 1 and “Choose which picture resembles the most closely others’ usual facial expression toward you” in the experiment 2. Participants’ task was to select one of the faces by pressing the corresponding button. An experiment consisted of twenty trials of 7.5 seconds, taking a total of 150 seconds. The position of the faces was randomly arranged in the series of trials. The face stimuli used in the task were selected from the Korean Facial Expressions of Emotion.39

Eye movement recording
While participants performed the tasks, eye movements were recorded using the SensoMotoric Instrument (SMI, Boston, USA) eye movement monitoring system. Participants’ eye position was maintained at a distance of approximately 50 cm from the monitor. Before the experiment, participants were instructed to fix their gaze at several dots to calibrate their eye movements. The sampling rate of eye gaze during the measurement was 120 Hz. The gaze data were analyzed with SMI BeGaze. A fixation was counted when participants gazed at the monitor within an area of 100 pixels for more than 80 ms. The area of interest (AOI) was defined as a box drawn around the stimulus face. The rate of fixation in the AOI was calculated for each subject and stimulus. Among 6 AOIs, data from the male and female faces with the same emotion were averaged, and thus the fixation time was counted for AOIs with 3 emotions, such as ‘happy’, ‘disgusted’, and ‘angry’.

Statistical analysis
Demographic data and scale scores were compared between the two groups using independent-sample t-tests, except for sex, which was analyzed using chi-square test. The selection count and fixation time in each experiment were analyzed with a linear mixed model to identify the main effects and interactions of group and facial emotion. Associations of the fixation time with the selection counts and scale scores in each group were examined with Pearson correlation analysis. Considering that there were three facial emotions in all analyses, a significance threshold was defined at p<0.017 (0.05/3).

RESULTS

Psychological assessments
As shown in Table 1, the RSES scores were 38.02±1.78 in the high SE group and 23.84±2.71 in the low SE group, and were significantly different between the two groups (p<0.001). All participants have the same age, and the two groups showed no difference in gender distribution and cognitive ability measured by the RPM. The BDI scores were significantly lower in the high SE group than in the low SE group (p<0.001). The high SE group showed significantly higher scores in satisfaction with life, autonomy, competence, and relatedness than the low SE group (all: p<0.001). In the NEO-PI-R, the high SE group showed significantly higher scores in extraversion (p<0.001), agreeableness (p=0.001), conscientiousness (p<0.001), and openness (p<0.001), but significantly lower in neuroticism (p<0.001) than the low SE group.

Task performance
The results of selection counts are shown in Table 2. The results were very similar between Experiment 1 and 2. In both experiments, most of the high SE group seldom chose ‘disgusted’ or ‘angry’, whereas a sizable number of the low SE group chose ‘disgusted’ and ‘angry’. The selection counts showed the main effect of emotion (Experiment 1: F2,11=528.18, p<0.0001; Experiment 2: F2,11=590.96, p<0.0001), but there was no main effect of group. Post-hoc test showed that the selection counts were significantly higher for ‘happy’ than for ‘disgusted’ and ‘angry’ (all: p<0.0001), but there was no difference between ‘disgusted’ and ‘angry’. The interaction effect of group x emotion was significant (Experiment 1: F2,11=15.46, p<0.0001; Experiment 2: F2,11=12.42, p<0.0001). Post-hoc test showed that the selection counts of ‘happy’ were significantly higher in the high SE group than in the low SE group, whereas those of ‘disgusted’ and ‘angry’ were significantly higher in the low SE group than in the high SE group (all: p<0.0001).
Eye-tracking data

Experiment 1 (Figure 2A): when selecting the face that the most closely resembled one’s own usual facial expressions, the fixation time showed the main effect of facial emotion ($F_{2,11}=126.94, p<0.0001$), but no main effect of group. In the post-hoc test, the fixation time was significantly shorter for ‘disgusted’ ($p<0.0001$) and ‘angry’ ($p<0.0001$) than ‘happy’. The interaction effect of group x facial emotion was significant ($F_{2,111}=15.52, p<0.0001$). The fixation time for ‘happy’ was significantly shorter in the low SE group than in the high SE group ($p<0.0001$), but those of ‘disgusted’ and ‘angry’ were not significantly different between the two groups.

Correlations between the selection count and fixation time (Table 3)

Experiment 1: the fixation time and selection count showed no correlation for all facial emotions in the high SE group, but they showed a positive correlation for ‘happy’ ($r=0.54, p<0.0001$) and ‘disgusted’ ($r=0.38, p<0.01$) in the low SE group.

Table 1. Characteristics of participants

| Characteristic                  | Self-esteem group | $\chi^2$ | p-value |
|--------------------------------|-------------------|---------|---------|
|                               | High group (N=55) | Low group (N=58) |         |         |
| Rosenberg self-esteem scale   | 38.02±1.78        | 23.84±2.71 | 33.05   | <0.001  |
| Male/female                    | 27/28             | 28/30   | 0.01*   | 0.931   |
| Raven’s progressive matrices   | 50.71±8.18        | 49.24±7.79 | 0.98    | 0.331   |
| Beck depression inventory      | 3.91±3.04         | 13.28±6.10 | -10.41 | <0.001  |
| Satisfaction with life scale   | 22.78±4.08        | 13.81±3.87 | 11.99   | <0.001  |
| Basic psychological needs scale|                   |         |         |
| Autonomy                       | 31.42±3.96        | 23.83±5.24 | 8.72    | <0.001  |
| Competence                     | 30.40±3.37        | 20.90±4.61 | 12.45   | <0.001  |
| Relatedness                    | 32.80±3.39        | 25.84±4.16 | 9.71    | <0.001  |
| NEO-personality inventory      |                   |         |         |
| Extroversion                   | 7.29±1.62         | 6.07±1.53 | 4.12    | <0.001  |
| Agreeableness                  | 7.91±1.54         | 6.95±1.43 | 3.43    | 0.001   |
| Conscientiousness              | 6.95±1.94         | 4.38±1.67 | 6.24    | <0.001  |
| Neuroticism                    | 4.96±1.64         | 6.86±1.63 | -6.17   | <0.001  |
| Openness                       | 8.36±1.70         | 7.24±1.84 | 3.36    | <0.001  |

*chi-square for categorical variable

Table 2. Selection counts out of 20 trials during the self-consciousness task

| Facial emotion | Self-esteem group | t | p-value |
|----------------|-------------------|---|---------|
|                | High group (N=55) | Low group (N=58) |         |
| Experiment 1: own usual facial expression |                   |         |         |
| Happy          | 19.13±1.88        | 14.14±6.36 | 5.72    | <0.001  |
| Disgusted      | 0.35±0.80         | 1.97±2.46 | -4.76   | <0.001  |
| Angry          | 0.40±1.21         | 3.60±4.31 | -5.44   | <0.001  |
| Experiment 2: others’ facial expression toward oneself |                   |         |         |
| Happy          | 19.24±1.57        | 15.69±5.04 | 5.10    | <0.001  |
| Disgusted      | 0.36±0.82         | 1.83±2.23 | -4.67   | <0.001  |
| Angry          | 0.38±1.03         | 2.34±3.19 | -4.45   | <0.001  |
Experiment 2: in the high SE group, the fixation time and selection count showed a positive correlation for ‘angry’ ($r=0.33$, $p=0.014$), but no correlation for ‘happy’ and ‘disgusted’. In the low SE group, they showed a positive correlation for ‘happy’ ($r=0.39$, $p<0.01$), but no correlation for ‘disgusted’ and ‘angry’.

**Correlations between the psychological scale score and fixation time** (Table 3)

Experiment 1: in the high SE group, the significant results were the negative correlations between the autonomy scores and fixation time for ‘disgusted’ ($r=-0.39$, $p<0.01$) and ‘angry’.

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**Figure 2.** Group comparison of the fixation time for the happy, disgusted, and angry faces. A: One’s own usual facial expressions. B: Others’ facial expressions toward oneself. *$p<0.05$, **$p<0.01$, ***$p<0.001$.

**Table 3.** Correlations of the fixation time with the behavioral responses and scale scores

|                      | Selection count | Scale score          |
|----------------------|-----------------|----------------------|
|                      | Fixation time   |                      |
|                      | Experiment 1 (own) | Experiment 2 (other) |
|                      | High SE group   | Low SE group         |
|                      | Low SE group    | High SE group        |
|                      | Low SE group    |                      |
|                      | H    D   A     | H    D   A           |
|                      | H    D   A     | H    D   A           |
| H                    | 0.30  -   - 0.54*** | 0.21  -   - 0.39*** |
| D                    | -    0.17 -   - 0.38** | -    0.15 -   - 0.14 |
| A                    | -    -    -0.04 -   - 0.30 | -    -    -     0.33* |
| BDI                  | 0.07  0.12 0.26 -0.40** 0.08 0.11 | -0.09 0.15 0.26 -0.21 0.06 0.06 |
| Satisfaction with life| -0.05 -0.22 -0.28 0 -0.29 -0.28 | -0.15 -0.28 -0.19 0.05 -0.06 -0.05 |
| Autonomy             | -0.23 -0.39** -0.38** 0.13 -0.20 -0.28 | -0.15 -0.31 -0.31 0.07 -0.04 0.01 |
| Competence           | 0.05 -0.29 -0.34 0.19 -0.23 -0.23 | -0.13 -0.48** -0.51** 0.13 -0.04 -0.04 |
| Relatedness          | -0.13 -0.37** -0.39** 0.31 -0.18 -0.22 | -0.02 -0.12 -0.12 0.29 0.19 0.16 |
| Extroversion         | -0.08 -0.11 -0.13 -0.11 -0.01 0.01 | 0.29 0.09 0.1 0.03 0.2 0.15 |
| Agreeableness        | 0.03 -0.1 -0.07 0.07 -0.12 -0.13 | -0.09 -0.21 -0.27 -0.20 -0.09 -0.03 |
| Conscientiousness    | 0.2  -0.06 -0.11 0.22 -0.03 0 | 0.04 -0.32 -0.28 0.24 -0.02 -0.03 |
| Neuroticism          | -0.05 0.09 0.18 -0.01 -0.11 -0.11 | 0.06 0.16 0.12 0 -0.06 0 |
| Openness             | -0.08 0.03 -0.03 0.07 0.08 | 0.33* 0.14 0.22 0.11 0.14 0.13 |

*$p<0.05$, **$p<0.01$, ***$p<0.001$. SE: self-esteem, H: happy, D: disgusted, A: angry, BDI: Beck Depression Inventory
esteem theory has predicted that the higher an individual’s tendency. Meanwhile, the selection count and fixation time with autonomy, competence, and relatedness grows pro-social consistent with the argument that a person who is satisfied may look at himself or herself desirable. These results are consistent with previous findings that individuals with high self-esteem had more stability as well as positive emotions and lower emotional changes than those with low self-esteem. Self-esteem theory has predicted that the higher an individual’s self-evaluation, the less reciprocation of evaluations from others. In particular, this group showed that the fixation time for ‘disgusted’ and ‘angry’ were negatively correlated with the autonomy and relatedness scores in Experiment 1 and the competence scores in Experiment 2, suggesting that the more self-determination of an individual may be linked to the less negative view of himself or herself. These correlations may be consistent with the argument that a person who is satisfied with autonomy, competence, and relatedness grows pro-social tendency. Meanwhile, the selection count and fixation time for ‘happy’ were significantly correlated in the low SE group, but not in the high SE group. This group difference may be attributed to the ceiling effect of these responses to happy emotion in the high SE group.

In the selection counts, a sizable number of the low SE group chose ‘disgusted’ and ‘angry’ rather than ‘happy’. These features were confirmed in the eye-tracking measurement, which showed that the fixation times for ‘disgusted’ and ‘angry’ were significantly longer in the low SE group than in the high SE group. These results suggest that adolescents with low self-esteem tend to negatively recognize their own facial expressions and the others’ facial expressions toward themselves. It has been demonstrated that lower self-esteem is correlated with more negative emotions and higher public self-consciousness. Relationships between suppression of positive emotions and self-esteem adjustment are mediated by a negative affect. The underlying discrepant state of self-consciousness may contribute to their increased negative affect in the low SE group. It should be considered, for example, that self-awareness tasks increased negative affect among participants with low explicit and high implicit self-esteem. Furthermore, in the low SE group, the fixation time for ‘happy’ was inversely correlated with the depression score. Low self-esteem in adolescence has been considered to be a predictor of the development of depression in early adulthood. Recent longitudinal studies have also demonstrated that sustained or worsening disordered behaviors and low self-esteem in adolescents are precursors of depressive symptoms. It should be noted that depression in adolescence has been associated with negative attributional style, limited interpersonal relationships, increased likelihood of social isolation, and overall maladjustment as well as low self-esteem. In addition, lower self-esteem and negative emotions in adolescents sequentially mediate the relationship between body dissatisfaction and disordered eating. Taken together, there is a close relationship among low self-esteem, suppressing positive emotions, decreased psychological adjustment, and increased negative emotions. Given this relationship, it is important to identify adolescents at risk for depression. Our self-conscious task may be useful to screen them in need of early interventions.

The low SE group showed significant differences in all basic psychological needs components and personality domains compared with the high SE group. However, basic psychological needs components were inversely correlated with the fixation time for negative emotions in the high SE group, whereas there were no correlations between the personality types and fixation time in both groups. These results suggest that self-conscious behaviors are related to basic psychological needs rather than personality types. According to the self-determination theory, positive emotion is merely a by-product of need satisfaction and all forms of mental health are ultimately sup-

DISCUSSION

In this study the relationship between self-esteem and self-consciousness was investigated in adolescents using the two separate experiments of recognizing one’s own facial expressions and the others’ facial expressions toward oneself. The selection counts in both experiments were very similar. Although a difference of the fixation time between the high and low SE groups was significant only for ‘disgusted’ and ‘angry’ when recognizing one’s own facial expressions and only for ‘happy’ when recognizing the others’ facial expressions toward oneself, the overall patterns of the fixation time in both experiments were also similar. Therefore, it seems that the effects of self-esteem on self-consciousness have a similarity between the private and public ones.

In the selection counts, most of the high SE group chose ‘happy’, suggesting that adolescents who have high self-esteem tend to pay attention to positive emotions much more than negative emotions. This feature was confirmed in the fixation time, which was far longer for ‘happy’ than for ‘disgusted’ and ‘angry’, suggesting that an adolescent with high self-esteem may look at himself or herself desirable. These results are consistent with previous findings that individuals with high self-esteem had more stability as well as positive emotions and lower emotional changes than those with low self-esteem. Self-esteem theory has predicted that the higher an individual’s self-evaluation, the less reciprocation of evaluations from others. In particular, this group showed that the fixation time for ‘disgusted’ and ‘angry’ were negatively correlated with the autonomy and relatedness scores in Experiment 1 and the competence scores in Experiment 2, suggesting that the more self-determination of an individual may be linked to the less negative view of himself or herself. These correlations may be consistent with the argument that a person who is satisfied with autonomy, competence, and relatedness grows pro-social tendency. Meanwhile, the selection count and fixation time for ‘happy’ were significantly correlated in the low SE group, not in the high SE group. This group difference may be attributed to the ceiling effect of these responses to happy emotion in the high SE group.

In the selection counts, a sizable number of the low SE group chose ‘disgusted’ and ‘angry’ rather than ‘happy’. These features were confirmed in the eye-tracking measurement, which showed that the fixation times for ‘disgusted’ and ‘angry’ were significantly longer in the low SE group than in the high SE group. These results suggest that adolescents with low self-esteem tend to negatively recognize their own facial expressions and the others’ facial expressions toward themselves. It has been demonstrated that lower self-esteem is correlated with more negative emotions and higher public self-consciousness. Relationships between suppression of positive emotions and self-esteem adjustment are mediated by a negative affect. The underlying discrepant state of self-consciousness may contribute to their increased negative affect in the low SE group. It should be considered, for example, that self-awareness tasks increased negative affect among participants with low explicit and high implicit self-esteem.

Furthermore, in the low SE group, the fixation time for ‘happy’ was inversely correlated with the depression score. Low self-esteem in adolescence has been considered to be a predictor of the development of depression in early adulthood. Recent longitudinal studies have also demonstrated that sustained or worsening disordered behaviors and low self-esteem in adolescents are precursors of depressive symptoms. It should be noted that depression in adolescence has been associated with negative attributional style, limited interpersonal relationships, increased likelihood of social isolation, and overall maladjustment as well as low self-esteem. In addition, lower self-esteem and negative emotions in adolescents sequentially mediate the relationship between body dissatisfaction and disordered eating. Taken together, there is a close relationship among low self-esteem, suppressing positive emotions, decreased psychological adjustment, and increased negative emotions. Given this relationship, it is important to identify adolescents at risk for depression. Our self-conscious task may be useful to screen them in need of early interventions.

The low SE group showed significant differences in all basic psychological needs components and personality domains compared with the high SE group. However, basic psychological needs components were inversely correlated with the fixation time for negative emotions in the high SE group, whereas there were no correlations between the personality types and fixation time in both groups. These results suggest that self-conscious behaviors are related to basic psychological needs rather than personality types. According to the self-determination theory, positive emotion is merely a by-product of need satisfaction and all forms of mental health are ultimately sup-
ported by psychological need satisfaction.\textsuperscript{53} The satisfaction of typical basic psychological needs is also crucial for experiencing wellbeing and esteem for one's community.\textsuperscript{54}

This study had a few limitations despite the meaningful results above. First, academic achievement is an important factor for investigating self-esteem in high school students.\textsuperscript{55} Because all participants were school students, they may have been greatly impacted by academic achievement; however, this parameter was not included in the analysis. Second, although the levels of self-esteem can differ between male and female adolescents,\textsuperscript{56} this difference was not analyzed because it was not a focus in this study. Third, all participants were second-year students in Korean high schools. An age variation in adolescence and a cultural difference in cognitive self-evaluations\textsuperscript{57} could not be analyzed in this study.

In summary, we studied the relationship between self-esteem and self-consciousness in adolescents using eye-tracking measures for one's own facial expressions and the others' facial expressions toward oneself, and found that higher self-esteem was connected to more positive identification of their usual facial expressions and others' facial expressions. Furthermore, the fixation time for 'happy' was inversely correlated with the depression score in adolescents with low self-esteem, suggesting that low self-esteem is associated with depressive behaviors in adolescence. Given that low self-esteem in adolescence are precursors of depressive symptoms, our self-conscious task may be used to identify adolescents at risk for depression and in need of appropriate interventions. Forwards, many types of research are needed to be done on emotional identification on self to know how to promote and maintain self-esteem in adolescents, which is the ultimate aim.

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Conflicts of Interest

The authors have no potential conflicts of interest to disclose.

Author Contributions

Conceptualization: Eun Seong Kim, Jae-Jin Kim. Data acquisition: Eun Seong Kim, Yeon-Ju Hong, Minwoo Kim. Formal analysis: Eun Seong Kim. Funding: Jae-Jin Kim. Supervision: Eun Joo Kim. Writing—original draft: Eun Seong Kim. Writing—review & editing: Eun Joo Kim, Jae-Jin Kim.

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REFERENCES

1. Hare TA, Tottenham N, Galvan A, Voss HU, Glover GH, Casey B. Biological substrates of emotional reactivity and regulation in adolescence during an emotional go-no-go task. Biol Psychiatry 2008;63:927-934.
2. Silk JS, Steinberg L, Morris AS. Adolescents' emotion regulation in daily life: Links to depressive symptoms and problem behavior. Child Dev 2003;74:1869-1880.
3. Repetti RL, Taylor SE, Seeman TE. Risky families: family social environments and the mental and physical health of offspring. Psychol Bull 2002;128:330-366.
4. Cole PM, Martin SE, Dennis TA. Emotion regulation as a scientific construct: methodological challenges and directions for child development research. Child Dev 2004;75:317-333.
5. Sadovnikova T. Self-esteem and interpersonal relations in adolescence. Procedia Soc Behav Sci 2016;623:440-444.
6. Rogers CR. Toward a science of the person. J Humanist Psychol 1963; 3:72-92.
7. Furnham A, Cheng H. Perceived parental behaviour, self-esteem and happiness. Soc Psychiatry Psychiatr Epidemiol 2000;35:463-470.
8. Soensens B, Berzonsky MD, Papini DR. Attending to the role of identity exploration in self-esteem: longitudinal associations between identity styles and two features of self-esteem. Intern J Behav Dev 2016;40:420-430.
9. Kerns MH. Toward a conceptualization of optimal self-esteem. Psychol Inq 2003;14:1-26.
10. Markus HR, Kitayama S. Culture and the self: implications for cognition, emotion, and motivation. Psychol Rev 1991;98:224-253.
11. Leary MR, Tambor ES, Terald SK, Downs DL. Self-esteem as an interpersonal monitor: the sociometer hypothesis. J Pers Soc Psychol 1995; 68:518-530.
12. Murray SL, Holmes JG, Collins NL. Optimizing assurance: the risk regulation system in relationships. Psychol Bull 2006;132:641-666.
13. Barrett LE, Gross J, Christensen TC, Benvenuto M. Knowing what you're feeling and knowing what to do about it: mapping the relation between emotion differentiation and emotion regulation. Cogn Emot 2001;15: 713-724.
14. Rieffe C, Oosterveld P, Miers AC, Terwogt MM, Ly V. Emotion awareness and internalising symptoms in children and adolescents: the Emotion Awareness Questionnaire revised. Pers Indiv Differ 2008;45:756-761.
15. Ochsner KN, Gross J. The cognitive control of emotion. Trends Cogn Sci 2005;9:242-249.
16. Lopes PN, Salovey P, Catá S, Beers M. Emotion regulation abilities and the quality of social interaction. Emotion 2005;5:113-118.
17. Lopes PN, Brackett MA, Nezlek JB, Schatz A, Selin I, Salovey P. Emotional intelligence and social interaction. Pers Soc Psychol Bull 2004; 30:1018-1034.
18. Pinkham AE, Penn DL. Neurocognitive and social cognitive predictors of interpersonal skill in schizophrenia. Psychiatry Res 2006;143:167-178.
19. Pennebaker JW, Zech E, Rimé B. Disclosing and Sharing Emotion: Psychological, Social, and Health Consequences. In: Stroebe MS, Hansson RO, Stroebe W, Schüt H, Editors. Handbook of Bereavement Research: Consequences, Coping, and Care. Washington DC: American Psychological Association; 2001.
20. Swinkels A, Giuliano TA. The measurement and conceptualization of mood awareness: monitoring and labeling one's mood states. Pers Soc Psychol Bull 1995;21:934-949.
21. Rieffe C, De Rooij M. The longitudinal relationship between emotion awareness and internalising symptoms during late childhood. Eur Child Adolesc Psychiatry 2012;21:349-356.
22. Okawara H, Sugitani M, Sekiguchi A, Tsukienu T, Miyachi CM, Hashimoto T, et al. Self-face evaluation and self-esteem in young females: an fMRI study using contrast effect. Neuroimage 2012;59:3668-3676.
23. Hu Y, Liao S, Luo W, He W. Effects of self-esteem on self-face recognition: an eye movement study. Open J Soc Sci 2013;1:40-42.
24. Garofalo C, Holden CJ, Zeigler-Hill V, Velotti F. Understanding the connection between self-esteem and aggression: the mediating role of emotion dysregulation. Aggress Behav 2016;42:3-15.
25. Fenigstein A, Scheier MF, Buss AH. Public and private self-conscious-
ness: assessment and theory. J Consult Clin Psychol 1975;45:522-527.

26. Moss TP, Rosser BA. The moderated relationship of appearance valence on appearance self-consciousness: development and testing of new measures of appearance schema components. PLoS One 2012;7:e50605.

27. Tebbe NJ, Thomas DW, Price F. Anxiety and self-consciousness in patients with minor facial lacerations. J Adv Nurs 2004;57:417-426.

28. Franzoi SL, Davis MH, Young RD. The effects of private self-consciousness and perspective taking on satisfaction in close relationships. J Pers Soc Psychol 1985;48:1584-1594.

29. LaBrie JW, Hummer JF, Neighbors C. Self-consciousness moderates the relationship between perceived norms and drinking in college students. Addict Behav 2008;33:1529-1539.

30. DaSilveira A, DeSouza ML, Gomes WB. Self-consciousness concept and assessment in self-report measures. Front Psychol 2015;6:930.

31. Salovey P, Mayer JD. Emotional intelligence. Imagin Cogn Pers 1990;9:185-211.

32. Lee JY, Nam SK, Lee MK, Lee SM. Rosenberg’ self-esteem scale: analysis of item-level validity. Korean J Couns Psychother 2009;21(Suppl1):173-189.

33. Rosenberg M. Society and the Adolescent Self-Image. Princeton, NJ: Princeton University Press; 1965.

34. Beck AT. Depression: Clinical, Experimental and Theoretical Aspects. New York: Harper and Row; 1967.

35. Diener E, Emmons RA, Larsen RJ, Griffin S. The satisfaction with life scale. J Pers Assess 1985;49:71-75.

36. Johnston MM, Finney SJ. Measuring basic needs satisfaction: evaluating previous research and conducting new psychometric evaluations of the Basic Needs Satisfaction in General Scale. Contemp Educ Psychol 2010;35:280-296.

37. Costa PT, McCrae RR. Normal personality assessment in clinical practice: the NEO Personality Inventory. Psychol Assess 1992;4:3-13.

38. Raven JC. Standard Progressive Matrices. London: H. K. Lewis; 1958.

39. Park JY, Oh JM, Kim SY, Lee MK, Lee CR, Kim BR, et al. Korean Facial Expressions of Emotion (KOFEE). Seoul, Korea: Section of Affect & Neuroscience, Institute of Behavioral Science in Medicine, Yonsei University College of Medicine; 2011.

40. Campbell JD. Self-esteem and clarity of the self-concept. J Pers Soc Psychol 1990;59:538-549.

41. Jones SC. Self- and interpersonal evaluations: Esteem theories versus consistency theories. Psychol Bull 1973;79:185-199.

42. Ryan RM, Deci EL. Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. Am Psychol 2000;55:68-78.

43. Green MC, Kaufman G, Flanagan M, Fitzgerald K. Self-esteem and public self-consciousness moderate the emotional impact of expressive writing about experiences with bias. Pers Individ Diff 2017;116:212-215.

44. Nezlek JB, Kuppens P. Regulating positive and negative emotions in daily life. J Pers 2008;76:561-580.

45. Cheng CM, Govuron O, Chartrand TL. Effect of self-awareness on negative affect among individuals with discrepant low self-esteem. Self Identity 2012;11:304-316.

46. Keane L, Loades M. Low self-esteem and internalizing disorders in young people—a systematic review. Child Adolesc Ment Health 2017;22:4-15.

47. Leung CY, Leung GM, Schooling CM. Behavioral problem trajectories and self-esteem changes in relationship with adolescent depressive symptoms: a longitudinal study. Soc Psychiatry Psychiatr Epidemiol 2018;53:673-684.

48. Masselin M, Van Roekel E, Oldehinkel AJ. Self-esteem in early adolescence as predictor of depressive symptoms in late adolescence and early adulthood: the mediating role of motivational and social factors. J Youth Adolesc 2018;47:932-946.

49. Hilsman R, Garber J. A test of the cognitive diathesis-stress model of depression in children: attributional style, perceived competence, and control. J Pers Soc Psychol 1995;69:370-380.

50. Shahar G, Henrich CC. Do depressive symptoms erode self-esteem in early adolescence? Self Identity 2010;9:403-415.

51. Trijković I, Roje R, Krišč S, Nazor M, Karin Ž, Čapkun V. Depression and self-esteem in early adolescence. Cent Eur J Public Health 2015;23:142-145.

52. Cruz-Sáez S, Pascual A, Włodarczyk A, Echeburúa E. The effect of body dissatisfaction on disordered eating: the mediating role of self-esteem and negative affect in male and female adolescents. J Health Psychol 2018 [Epub ahead of print].

53. Sheldon KM. The self-determination theory perspective on positive mental health across cultures. World Psychiatry 2012;11:101-102.

54. Molix LA, Nichols CP. Satisfaction of basic psychological needs as a mediator of the relationship between community esteem and well-being. Int J Wellbeing 2013;3:20-34.

55. Covington MV. Self-Esteem and Failure in School: Analysis and Policy Implications. In: Mecca AM, Smeiser NJ, Vasconcellos J, Editors. The Social Importance of Self-Esteem. Berkeley: University of California Press, 1989, p.72-124.

56. Boudreault-Bouchard AM, Dion J, Hains J, Vandermeerschen J, LaBerge L, Perron M. Impact of parental emotional support and coercive control on adolescents’ self-esteem and psychological distress: results of a four-year longitudinal study. J Adolesc 2013;36:695-704.

57. Cai H, Brown JD, Deng C, Oakes MA. Self-esteem and culture: differences in cognitive self-evaluations or affective self-regard? Asian J Soc Psychol 2007;10:162-170.