심리학석사 학위논문

Effects of Mindsets and VR Experiences on Empathy and Prosociality

마인드셋과 VR 경험이 공감 및 친사회성에 미치는 영향

2023년 8월

서울대학교 대학원

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Abstract

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Recently, as social conflicts become a serious problem, empathy and prosociality have emerged as helpful solutions. Prior studies have demonstrated that a growth mindset and VR experiences independently enhance empathic and prosocial attributes. However, the combined influence of a growth mindset and VR experiences is yet to be explored. The present research investigated whether a growth mindset and VR experiences affect the level of empathy and prosociality. In Study 1, we compared the effect of a growth mindset and a fixed mindset on empathic and prosocial indices. Participants were instructed to read an article on each type of mindset (i.e., malleable and fixed) and leave comments to comfort others. In Study 2, we implemented the combined intervention to understand the potential synergistic effect of using a growth mindset and VR experiences together. We developed a prosocial VR program and let participants play it. Both in Study 1 and Study 2, our manipulation of letting participants endorse a particular type of mindset was effective. Participants who supported a growth mindset in Study 1 showed significantly higher levels of empathic effort and state empathy than those who supported a fixed mindset. The growth mindset group also reported higher scores in empathic motives, trait empathy, and prosociality, but the differences were not statistically significant. In Study 2, participants in the combined group showed significantly higher empathic motives than those in the VR-only and the control

groups. The combined group also reported the highest scores in empathic effort, trait empathy, and hypothetical prosocial behavior across the groups, but the differences were not significant. The current study suggests that endorsing a growth mindset on empathy fosters empathy and prosociality. Furthermore, the study shows that using both a cognitive training method (i.e., a growth mindset) and a behavioral one (i.e., VR experience) is critical for empathy education.

Keywords **:** empathy, prosociality, growth mindset, Virtual Reality

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Chapter 1. Introduction

1.1. Background

Aristotle once said, “Man is by nature a social animal.” We humans inevitably experience both cooperation and conflict during our lifetime. Unfortunately, social conflicts have been widespread for several decades in South Korea: between conservatism and liberalism (political), men and women (gender), and the younger and the older (generational) (Han, 2022; Kim, 2019; Lee, 2021).

Empathy, imperative for socializing with others, can contribute to solving social problems (de Wied et al., 2007; Klimecki, 2019). People with high empathy (i.e., sensitively responsive to others’ emotional states) tend to better manage conflict by preventing destructive and encouraging constructive communication (de Wied et al., 2007).

Specifically, empathy plays a role in understanding out-group members and helping them (Shih et al., 2009; Sierksma et al., 2014). Intergroup conflicts usually stem from a gap between two different viewpoints or goals from each group (Wall & Callister, 1995). Empathy, particularly perspective-taking (i.e., walking in someone else’s shoes), helps comprehend the thoughts and backgrounds of out-group members and increase prosocial actions toward them (Shih et al., 2009; Todd & Galinsky, 2014) by decreasing perceptions of dissimilarity and prejudice (Shih et al., 2009; Stephan & Finlay, 1999).

For the reasons mentioned above, studying how to enhance people’s empathy and prosocial behaviors has practical implications and will produce promising applications. Therefore, this study uses mindsets and Virtual Reality experiences to investigate how to improve one’s empathy and prosocial actions.

1.2. Empathy and Prosociality

1.2.1. Empathy and Empathic Motives

Empathy, originated from the German word *Einfühlung*, is the ability to feel and understand what others feel and think (Davis, 1994; Weisz et al., 2021; Zaki, 2014). It is differentiated from sympathy which is automatically induced by observing others' distress in that empathy covers an agent's intentional efforts to understand and go through others' experiences (Davis, 1994).

Empathy is a multifaceted concept consisting of diverse subcomponents. One of the typical divisions of empathy is state versus trait. State empathy is induced by a specific situation or object (Cuff et al., 2016; Shen, 2010). For instance, if someone empathizes with the homeless after watching a video of their daily lives, regardless of his usual level of empathy, it indicates that his state empathy has increased. On the contrary, trait empathy is similar to one's capacity or ability (e.g., someone usually tends to feel high empathy with others) (Cuff et al., 2016).

Davis (1983) suggested that empathy is not a unitary, but a multidimensional concept, composed of four categories - perspective-taking, fantasy, empathic concern, and personal distress - and developed Interpersonal Reactivity Index (IRI) to measure each dimension separately. Perspective-taking is experiencing another's point of view, and fantasy indicates projecting oneself into the feelings of imaginary characters from movies or books. The empathic concern involves "other-oriented" feelings such as concern, while personal distress usually indicates "self-oriented" feelings such as anxiety. Davis (1983) showed that perspective-taking was included in the cognitive aspect of empathy, whereas empathic concern and fantasy were covered within the emotional and affective one.

Decety and Jackson (2004) also agreed with the multidimensional nature of

empathy. They segregated the concept into three components - affective sharing, self-other awareness, and mental flexibility. Affective sharing indicates feeling what others also feel. People who experience self-other awareness do not confuse self and other even in identification. Mental flexibility is required to embrace others' perspectives or thinking processes.

Likewise, empathy as a combination of emotional, cognitive, and motivational components has been continuously elaborated (de Waal, 2007; de Waal, 2012; Preston & de Waal, 2002; Weisz & Cikara, 2021; Zaki & Ochsner, 2012). The *'Russian doll' model*, suggested by de Waal (2007), divided empathy into emotional contagion, cognitive empathy, and perspective-taking. The construction of Zaki and Ochsner (2012) also includes experience sharing, mentalizing, and prosocial concern. Experience sharing and emotional contagion refer to affective empathy, the ability to catch others' emotional states and go into what others feel and experience. Mentalizing or cognitive empathy involves perspective-taking and theory of mind (ToM), which means understanding what others experience and think. The last component, prosocial concern, stands for motivational empathy, sympathy, and empathic concern (Weisz & Cikara, 2021).

As it implies that empathy has a motivational feature, human motives are the basis of the empathy process (Weisz et al., 2021; Zaki, 2014). Empathic motives are internal drives that make people pursue or avoid social connections with others (Weisz & Zaki, 2018; Zaki, 2014). These can be classified into *Avoidance* and *Approach motives* (Weisz & Zaki, 2018). Avoidance motives inhibit empathy, whereas approach motives facilitate it. For example, if someone watches a video of homeless people and feels pain watching it, avoidance motives are activated. However, if he is willing to help them through donations or volunteering after

watching, approach motives are provoked. To improve one's empathy, it is necessary to stimulate empathic motives, especially approach motives.

1.2.2. Associations of Prosocial Behaviors and Empathy

Prosocial behaviors (or *prosociality*) point to actions that can assist others and aim at enhancing others' well-being (Batson et al., 1981; Jensen, 2016). Prosociality can be differentiated into three levels - meso, micro, and macro (Penner et al., 2005). The meso level of prosociality refers to altruistic behaviors among interpersonal relationships in people's daily lives. Prosocial actions at the micro level involve genetic and evolutionary aspects of humans. Lastly, the macro level represents organizational prosociality, including volunteering and cooperative actions. In this study, the prosocial behaviors will be limited to meso and macro levels: focusing on prosocial actions in interpersonal cases and volunteering.

It has been prominent that empathy is a powerful motivator of prosocial behaviors (Batson et al., 1981; Batson et al., 1987; Cialdini et al., 1987; Nook et al., 2016). According to the *Empathy-Altruism Thesis* (Batson et al., 1987), empathy provokes helping or altruistic motivation. When we watch others suffering from something, we can feel empathy towards them and empathy stimulates altruistic motivation to decrease their pain, which finally leads to helping behaviors. Some researchers have recognized empathy as an imperative factor for counseling, a prosocial action requiring high interpersonal skills (Clark, 2010; Reynolds & Scott, 1999).

Eisenberg and Miller (1987) also discovered accumulated results of a positive association between empathy and prosocial indices from previous studies through meta-analysis. Moreover, they found that researchers have tried to elevate

participants' empathic tendencies through training and the interventions have brought about a rise in prosocial tendencies together, which continues to a recent study as well (Weisz et al., 2022).

The relationship between empathy and prosocial behaviors is applied not only to humans but also to non-human animals (Bartal et al., 2011; Liebal et al., 2014). Besides apes, which are genetically close to humans, rats were also discovered to aid their cage mates in predicaments without any training or social reward (Bartal et al., 2011).

Since empathy promotes adaptive behaviors such as helping or cooperation, it is necessary for human beings to maintain social connections (Batson et al., 1981; Rumble et al., 2010). Although humans instinctively favor in-groups who share more similarities than out-groups, it has been figured out that empathy facilitates out-group helping (Lotz-Schmitt et al., 2017). Moreover, humans have done lots of altruistic behaviors for others, enduring adverse outcomes or costs (Bartlett & DeSteno, 2006; McAndrew, 2002). It is supported by the *Warm Glow Effect* (de Waal, 2012) that intrinsic reward is the motivation for prosocial behaviors (unrepaid altruism), which is vital to conflict resolution.

1.3. Increasing Empathy through Mindsets

1.3.1. Empathy Interventions

Empathy can be trained through interventions (Eisenberg & Miller, 1987; Lam et al., 2011; Weisz et al., 2021). Empathy interventions or training have been studied in various ways (Batt-Rawden et al., 2013; Whitford & Emerson, 2019; Winning & Boag, 2015). Most of them focused on technique-based methods such as perspective-taking, recognizing others' emotions and responding to them, and experiencing

communication or interpersonal skills (Batt-Rawden et al., 2013; Teding van Berkhout & Malouff, 2016).

However, questions were raised if or not these skill-based interventions are sufficient for education because they are usually context-dependent and hard to generalize (Weisz et al., 2021). Lam et al. (2011) also pointed out that there is a lack of evidence on whether the effects of these methods could still be maintained in natural environments.

Considering that empathy is a motive-based process (Weisz et al., 2021; Zaki, 2014), it was interpreted that empathy would be consistently increased regardless of context when empathic motives were stimulated (Schumann et al., 2014; Weisz et al., 2021; Weisz et al., 2022). *Motivation-Based Interventions* improve peoples' empathy by stimulating their empathic motives in two ways: mindsets and social norms (Weisz et al., 2021; Weisz et al., 2022).

1.3.2. Mindsets

Mindsets are beliefs about the nature of specific characteristics people possess, such as intelligence or personality (Dweck, 2006; Dweck, 2012). It started from *Implicit Self-Theory Model* (Dweck, 1999), which explains how people view or understand their abilities such as intelligence (Dweck, 1999).

The way people see their unique attributes has two subtypes: growth mindset (incremental theory) and fixed mindset (entity theory) (Dweck, 1999; Dweck, 2006; Dweck, 2012). When people endorse a growth mindset, they try to improve their ability based on setbacks and face challenges. On the other hand, those who have a fixed mindset believe that one's traits or attributes are hard to change and thus try to validate their ability by avoiding challenges.

The association between mindsets and one's intelligence has been steadily discovered. For example, Robins and Pals (2002) demonstrated that a fixed or growth mindset influenced one's academic achievement and related thoughts or behaviors (e.g., goals, efforts, attributions) in the college context. Participants with a changeable view of their intellectual capacity tended to seek learning goals rather than performance goals. The former helped them to develop their abilities and go forward, while the latter aided them to demonstrate their capacities and to remain in place.

Moreover, mindsets presented the possibility of playing a crucial role in conflict resolution. Halperin and his colleagues (2011) found that a malleable mindset against hostile counterparts (e.g., out-groups are not permanently damaging or wicked) led to less prejudice and more willingness to interact with them among Israeli Jews and Palestinians. In other words, thinking that the nature of out-groups is changeable over time helps to possess flexible thoughts toward out-groups, which results in solving intergroup conflicts.

1.3.3. Motivation-Based Interventions with Mindsets

Mindsets also can affect empathy, a key to solving conflicts, via training. Schumann et al. (2014) found that almost half of Americans naturally believe their empathic abilities can change over time. Participants who believed their empathic abilities could develop reported higher empathic effort and willingness to help others than those who thought they could not enhance their empathy. Participants with malleable mindsets seemed to pursue growth and try to overcome their shortcomings in empathic ability (Dweck, 2017; Schumann et al., 2014).

Interventions applying both mindsets and social norms effectively improved the

empathy of first-year students from Stanford University (Weisz et al., 2021). Furthermore, emphasizing the social desirability of empathy significantly promoted empathic motives and prosociality of middle school students in California (Weisz et al., 2022). The studies above also observed the empathic patterns in natural environments: the number of new friends in college life or the nomination from classmates as the most prosocial one. It implies that motivation-based interventions overcome the limitation Lam et al. (2011) posed.

1.4. Virtual Reality

1.4.1. Definition of Virtual Reality

Virtual Reality (VR) endows a different world from where we live. Participants could explore underwater ecosystems (Markowitz et al., 2018) or fly to the sky like Superman (Rosenberg et al., 2013) in 3D VR. Furthermore, some could learn lessons by experiencing future outcomes of deforestation in the virtual environment (Ahn et al., 2014).

3D environments with highly developed technologies enable vivid and immersive experiences which once were embodied only via 2D environments (Bailenson, 2018). Realistic experiences are possible because VR, especially immersive VR (IVR), provides participants with feelings of presence as if they truly existed in 3D worlds (Rosenberg et al., 2013). *Psychological presence* is the feeling of "being there" (Bailenson, 2018), even though users are aware that the environment is fake and embodied through computer graphics (Sanchez-Vives & Slater, 2005). Presence is one of the essential concepts in understanding how VR works and gives an immersive experience to its users.

1.4.2. The Role of VR in Improving Empathy

As VR is also known as an "ultimate empathy machine" (Milk, 2015), various studies have shown that VR had a significant impact on improving empathy, perspective-taking, and prosocial behaviors (Herrera et al., 2018; Ho & Ng, 2022; Rosenberg et al., 2013; Schutte & Stilinović, 2017; Shin, 2018; Van Loon et al., 2018).

Schutte and Stilinović (2017) measured participants' immersion and empathy after showing them a 3D VR video of a girl living in a refugee camp. The film, called '*Clouds over Sidra*', showed the daily lives of the girl in the camp with her family and friends, offering a panoramic 360-degree head tracking display. People who watched the video via 3D virtual environments reported higher empathy toward refugees than those who watched it via the 2D medium.

Participants who walked in the shoes of particular others and experienced school life through a VR program also showed enhanced perspective-taking ability (Van Loon et al., 2018). The VR program applied in the study let participants experience a series of daily activities from unpacking one's suitcases to attending class and working out. They became particular others in the VR and completed the activities. Only when participants' virtual characters accorded with partners at the stage of measuring empathy, Virtual Reality Perspective-Taking (VRPT) was effective in elevating empathy. However, the study failed to induce an increase in prosocial behaviors.

Herrera et al. (2018) utilized a 3D VR program for becoming homeless and getting through their life. Participants lost their job and were evicted from their apartments as they could not pay rent. They rode on buses for shelter and met another homeless listening to his experiences. Participants who lived becoming homeless via

3D VR showed higher levels of empathy and more prosocial behaviors related to the homeless issue than those who did not. Particularly, it is noticeable that VRPT in the study led to individuals' higher prosocial actions such as signing the petition for homeless.

One study introduced the concept of superpowers and let participants save a person using the power via a VR program (Rosenberg et al., 2013). Participants who flew with the superpower showed more prosocial behaviors in the real world than those who rode in a helicopter and completed the mission. However, this study had some limitations. Helping the citizen in VR could not significantly induce prosocial behaviors in the real world. Additionally, the VR experience ended when they had just found the citizen without participants saving him in person.

Ho and Ng (2022) created a VR game for saving robots by extinguishing fire with water guns. Unlike the above studies letting individuals take the main player's point of view, this study made participants take perspectives of non-player characters (NPCs) by protecting them from fire. According to the mechanism from the study, VRPT influenced their perceived closeness to the NPCs and the closeness had an impact on participants' empathy towards the NPCs.

According to *General Learning Model* (Buckley & Anderson, 2006), inputs from prosocial video games influence one's internal states (e.g., cognition and affect) which ultimately direct the person's behavioral responses. The model also explains how VR programs affect players' helping actions. That is to say, prosocial experiences in VR shape players' internal states, and these states make participants behave prosocially in the physical world as well.

Based on the aforementioned studies, Virtual Reality is a useful tool for educating one's empathy and prosociality. This tool provides vivid virtual

environments where players can take the perspectives of others or practice helping actions as if they were in reality. In addition, becoming another person such as a refugee or homeless (Herrera et al., 2018; Schutte & Stilinović, 2017) or being a hero (Ho & Ng, 2022; Rosenberg et al., 2013) is available even though these experiences are hard to be realized in our daily lives. Users can enter specific environments regardless of realistic and spatiotemporal limitations, which is the biggest advantage of applying VR technologies.

1.5. Present Study

The present study aims to investigate the effect of a growth mindset and VR experiences on empathy and prosociality. Therefore, we conducted two independent studies.

In the first study, we applied a growth mindset and a fixed mindset on the malleability of empathy and compared the effects of each mindset on raising empathy and prosociality, as prior studies did (Schumann et al., 2014; Weisz et al., 2021; Weisz et al., 2022). Participants were instructed to read an article about the malleability of empathy based on each type of mindset and leave comments to others who look for advice concerning interpersonal relationships. The research questions we wanted to answer from the first study are as the following.

RQ_1. Is the way of reading an article and leaving comments useful in endorsing particular types of mindsets among participants?

$RQ_{2\text{-}1}$. Is endorsing a growth mindset effective in elevating empathy?

$RQ_{2\text{-}2}$. Is endorsing a growth mindset helpful for raising prosociality?

In the second study, we developed a prosocial VR program and let participants complete missions by being a superhero in the virtual environment. One group only conducted the VR experience while the other read an article about growth mindset together with the VR experience. Then we examined whether the combination of a growth mindset and VR experience had a positive effect, comparing these two groups to the control group. The research questions of the second study are as the following.

RQ$_3$. Is a newly developed VR program helpful for letting participants experience helping behaviors?

RQ$_{4\text{-}1}$. Is combining a growth mindset and VR experience effective in enhancing empathy?

RQ$_{4\text{-}2}$. Is combining a growth mindset and VR experience helpful for improving prosociality?

Chapter 2. Study 1

2.1. Method

2.1.1. Participants

A total of 280 people participated in this study. They were recruited from the Korean crowdsourcing platform *DeepNatural*. Only the survey link was distributed through the platform and all data was managed by the main researcher. The platform did not have any access to the responses collected.

We used attention check items to control participants' attention during the survey (e.g., *Please check 'strongly disagree' for this item*), since they conducted all the procedures online. There were two attention check items: one of them was put on the fourth scale (State Empathy Scale) and the other was put on the seventh scale (Prosocial Orientation Questionnaire) of the survey. Participants who gave wrong answers on at least one of two attention check items were deleted from the final data sample.

Also, we set the standard of how long it usually took for participants to complete all the procedures. We checked the quantile and calculated the average of the participants' duration. They usually spent about 35 minutes completing the survey. Considering that participants had to read 1 or 2 articles for 3 - 5 minutes each, leave comments, and respond to 70 items, we supposed that at least 15 minutes would be required for them to complete the experiment. Moreover, we judged that those who spent more than an hour lost their concentration on the survey because the trial run took an hour to accomplish the whole steps. As a result, those who took too short or too long (i.e., under 15 minutes or over 1 hour) to complete the survey were regarded

as outliers.

Based on the criteria aforementioned, forty-five participants were excluded from the analysis due to unreliable responses. The final sample for the data analysis consisted of 235 individuals (N_{male} = 43, M_{age} = 41.43, SD_{age} = 8.91).

2.1.2. Experiment Design

We conducted the first study with a between-subject design. The first group, "growth mindset", was manipulated with a growth mindset about malleable empathy. Participants in the growth mindset group read an article on changeable attributes of empathy. The second group was the "fixed mindset". Unlike the growth mindset group, the fixed mindset group read a superhero scenario as a filler task and then read an article that empathic ability is hard to change. All participants left comments for students who had trouble making friends at the new school, containing the details of each article they read.

Participants were randomly assigned to the two groups. The growth mindset group contained 112 people, while the fixed mindset group consisted of 123 individuals.

2.1.3. Materials

Malleable Empathy Article Participants in the growth mindset group read an article that empathy is malleable when we make an effort to raise our empathic ability. The article was translated into Korean from the original English version which was applied in the study of Schumann et al. (2014) and Weisz et al. (2021). The article contained some research results and projects which demonstrated that people's empathic abilities changed through education and practice. Participants read the

article for 3 to 5 minutes and evaluated how appropriate the article was in educating students, to hide the real purpose of reading the article. Then they were instructed to include the contents of the article while leaving a comment for a teenager who has difficulties in making friends.

Fixed Empathy Article Participants in the fixed mindset group read an article that empathy is hard to change in life. The fixed one was also translated into Korean from the original English version (Schumann et al., 2014; Weisz et al., 2021). The article involved some project results that participants had failed to enhance one's empathic ability despite education or practice. The rest of the procedure for this stimulus is identical to the malleable article.

Posting Stimuli Participants read short postings of students who have difficulty making friends and left a comment to support the students. The stimuli were created based on the original version - letter stimuli (Weisz et al., 2021), given that people are more accustomed to Internet postings than letters to express empathy. The student wrote that he (or she) is having a hard time adjusting to a new school, with no friends. Depending on the group, participants had to leave comments containing the details of the malleable empathy article or the fixed one.

Superhero Scenario Participants in the fixed mindset group read one more article which played the role of a filler task. Considering the contents of the fixed empathy article (e.g., *one's empathic ability is hard to change even if we try hard*), it was apprehended that participants would easily notice the original purpose of the study. Hence, we adopted the filler task only for the fixed mindset group to hide the original purpose of the study.

The article was described from a first-person perspective, so all readers became a superhero while reading it. Three crises that the superhero had to solve were

presented with detailed portrayals. The first mission was cleaning up the spilled cargo. The hero loaded the cargo on the truck with a superpower (psychokinesis). Then, the hero had to rescue cats on the road. Avoiding other cars, the superhero brought the cats trying to cross the road to a safety zone. The last mission was supplying emergency power to malfunctioning traffic lights at the intersection. With superpower, the hero attached electronic cables to the top of the traffic lights. After reading the article, participants were also required to recall the details of the scenario as possible as they could.

2.1.4. Measures

Malleability of Empathy To check whether manipulation was successful, we measured participants' beliefs on the malleability of empathy using the Theories of Empathy Scale (Schumann et al., 2014; Weisz et al., 2021). It included 6 items, 3 of which were about malleable attributes and the rest of which were about fixed ones of empathy. Participants were asked to rate the extent to which they agreed with each item on a 7-point Likert scale (1 = strongly disagree, 7 = strongly agree). The internal reliability was .93.

Empathic Motives Participants' empathic motives were measured through the scale called the Empathic Motives Questionnaire (Schumann et al., 2014; Weisz et al., 2022). Except for one item which was judged as unsuitable for the study, we used only 8 items on a 7 point-Likert scale. The internal reliability was .60.

Empathic Effort We measured the empathic effort of participants using the Empathic Effort Questionnaire from Schumann et al. (2014). Participants were asked about the extent to which they made an effort to empathize with the student on the posting, with 6 items on a 7 point-Likert scale. The internal reliability was .92.

State Empathy We used the State Empathy Scale (Shen, 2010) to measure participants' state empathy. Participants were asked to rate the extent to which they empathized with the students from the posting based on 10 items, on a 7-point Likert scale. Two items from the original version were deleted as they were not appropriate for the study. The internal reliability was .91.

Trait Empathy To assess participants' trait empathy score, we used the short Korean version (Park, 2017) of the Interpersonal Reactivity Index (Davis, 1980). This version only encompassed perspective-taking and empathic concern. Participants responded to 14 items on a 5-point Likert scale. The internal reliability was .78.

Prosociality We used Willingness to Help (Peng et al., 2010) and Prosocial Orientation Questionnaire (Cheung et al., 1998; Rosenberg et al., 2013) to measure participants' prosociality. We summed up scores of both scales and newly defined them as *prosociality scores*. The Willingness to Help scale consisted of 3 items on a 7-point Likert scale and the internal reliability was .75. The Prosocial Orientation Questionnaire was composed of 17 items on a 5-point Likert scale and the internal reliability was .83. The whole prosociality scale's internal reliability was .85.

Hypothetical Prosocial Behavior The participants were asked how much money they would donate if they got a bonus of ₩20,000 in return for their participation. They read a short passage about a Korean charity for children, "ChildFund Korea[①]". The scale was used to measure participants' hypothetical prosocial behavior (Carlson & Zaki, 2022). Rathje et al. (2021) originally applied an explanation about the charitable organization for the homeless in California to measure participants' willingness to donate. We modified it into the one appropriate for Korean study.

① https://www.childfund.or.kr/eng/main.do

Participants could respond from ₩0 to ₩20,000 on a ₩1,000 unit.

Furthermore, participants' demographic information was collected, such as age, gender, education level, and income level.

2.1.5. Procedure

We recruited participants with the research title changed for blinding: 'Reading Ability and Altruism.' Before reading an article about the attributes of empathy, only the fixed mindset group additionally read the superhero scenario and tried to remember the details of the scenario.

The growth mindset group read that empathy is malleable over time, while the fixed group read that empathy is hard to change. Both groups left comments to the students who worried about their interpersonal relationships. Finally, they took a series of surveys to measure their empathy and prosociality. All participants were debriefed on the original title and purpose of the study at the end of the experiment and allowed to decide whether to submit their answers. Consequently, all participants agreed to submit their responses.

2.2. Results

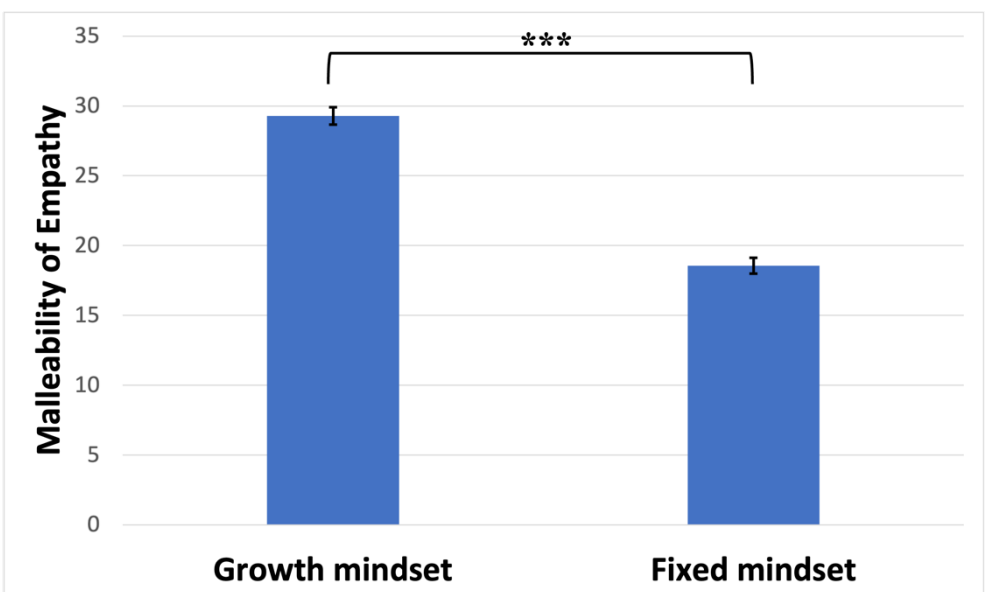
We conducted t-tests to compare scores between two groups and examine the effects of mindsets on empathy and prosocial attributes. As the sample size of Study 1 was 235, we postulated that the distributions of each variable would follow the normal distribution based on the *Central Limit Theorem*. The means and standard deviations of each score are presented in **Table 1**.

2.2.1. Manipulation Check

According to the manipulation check using the Malleability of Empathy scale, participants in the growth mindset group showed a significantly higher degree of empathy malleability than those in the fixed mindset group ($t(233) = 12.90$, $p < .001$, $d = 1.68$).

Figure 1

The Scores of Malleability of Empathy by Groups in Study 1



Note. *** $p < .001$

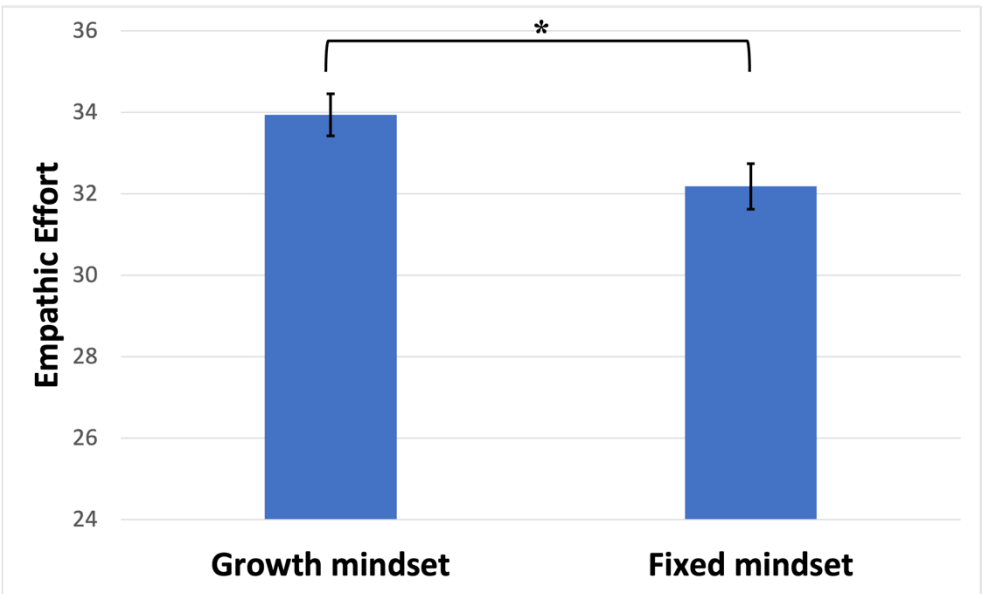
2.2.2. Empathic Motives and Empathic Effort

Empathic Motives For empathic motives, participants in the growth mindset group demonstrated higher scores than those in the fixed mindset group. However, the difference was not statistically significant ($t(233) = 1.26$, $p = .21$, $d = .16$).

Empathic Effort Participants in the growth mindset group indicated higher empathic effort than those in the fixed group. The difference was statistically significant ($t(233) = 2.30$, $p = .02$, $d = .30$).

Figure 2

The Scores of Empathic Effort by Groups in Study 1



Note. * $p < .05$

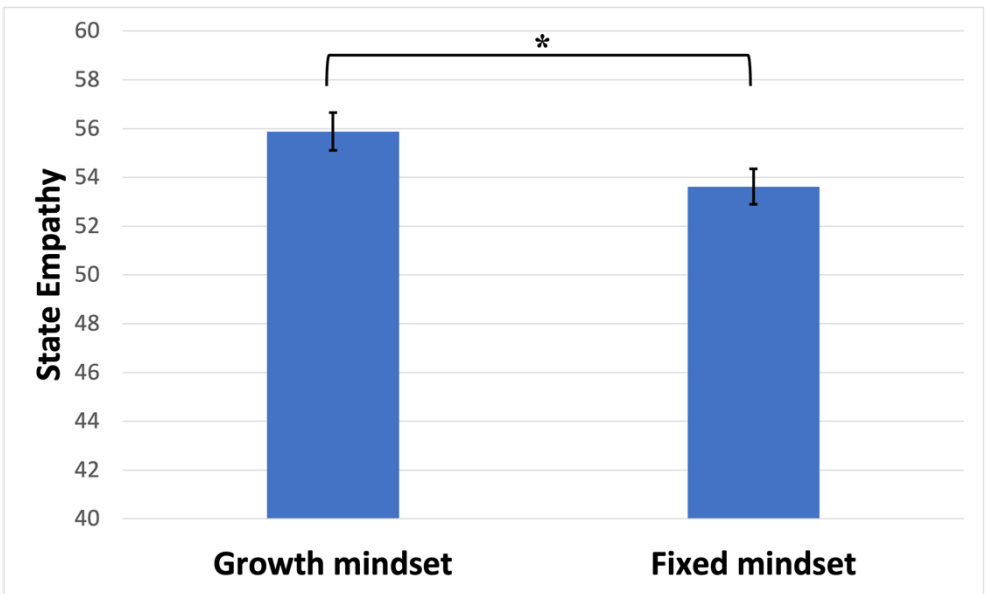
2.2.3. Empathy

State Empathy Participants in the growth mindset group answered higher scores of state empathy than those in the fixed mindset group, which was statistically significant ($t(233) = 2.12$, $p = .04$, $d = .28$).

Trait Empathy Although participants in the growth mindset group indicated higher levels of trait empathy than those in the fixed mindset group, the difference was not statistically significant ($t(233) = .83$, $p = .41$, $d = .11$).

Figure 3

The Scores of State Empathy by Groups in Study 1



Note. * $p < .05$

2.2.4. Prosocial Attributes

Prosociality Participants who read the growth mindset article showed higher prosociality than those who read the fixed mindset article. Still, the result was not statistically significant ($t(233) = 1.25$, $p = .21$, $d = .16$).

Hypothetical Prosocial Behavior Participants who endorsed the fixed mindset decided to donate more money than those who endorsed the growth mindset. However, the difference was not statistically significant ($t(233) = .02$, $p = .99$, $d = 0$).

Table 1

Means and Standard Deviations of Variables by Groups in Study 1

Group	Malleability of Empathy	Empathic Motives	Empathic Effort	State Empathy	Trait Empathy	Prosociality	Prosocial Behavior
	Mean (*SD*)	Mean (*SD*)	Mean (*SD*)	Mean (*SD*)	Mean (*SD*)	Mean (*SD*)	Mean (*SD*)
Fixed Mindsets	18.55 (6.20)	38.72 (4.92)	32.18 (6.18)	53.62 (8.14)	50.40 (5.38)	74.42 (8.25)	11854 (6815)
Growth Mindsets	29.29 (6.55)	39.58 (5.53)	33.94 (5.45)	55.88 (8.13)	51.00 (5.76)	75.59 (9.33)	11839 (6573)
Total	23.67 (8.32)	39.13 (5.23)	33.02 (5.90)	54.70 (8.19)	50.69 (5.56)	75.11 (8.79)	11947 (6686)

2.3. Discussion

In Study 1, we compared the growth and fixed mindset and investigated the effects of the mindsets on empathy and prosociality.

First, we tried to identify whether our manipulation made participants endorse certain types of mindsets (**RQ_1**). According to the result, our manipulation concerning the malleability of empathy was successful. Participants in the growth mindset group reported higher scores on the Theories of Empathy Scale than those in the fixed mindset group. It indicates that participants in the growth mindset believed more in the malleability of empathy than those in the fixed mindset. This result replicated the prior studies (Schumann et al., 2014; Weisz et al., 2021) and suggested that the way of reading an article and leaving comments while including the details of the article was effective.

Additionally, we investigated if participants' mindset types influenced their empathy and prosociality levels (**$RQ_{2\text{-}1}$** and **$RQ_{2\text{-}2}$**). Participants who endorsed a growth mindset presented significantly higher empathic effort than those who believed in a fixed mindset. The growth mindset group also showed higher state empathy scores than the fixed mindset group, which was statistically significant.

Although the growth mindset group reported higher levels than the fixed mindset group, there were no significant differences in empathic motives, trait empathy, and prosociality. These results may indicate that temporary practice with a single-session experiment was not enough to elicit remarkable differences. Weisz et al. (2021) also conducted at least three intervention sessions. Especially, as trait empathy is one's empathic ability accumulated over a long time (Cuff et al., 2016), it might be hard to change in a short time.

Nevertheless, the results indicate that the way we used in Study 1 was

successful in maintaining the mindsets during the experiment. Also, this method has the possibility of increasing empathic and prosocial capabilities in future studies as prior studies have already shown (Schumann et al., 2014; Weisz et al., 2021).

Unexpectedly, participants' hypothetical prosocial behavior, operationalized as the amount of money they chose to donate to the charitable organization, showed a pattern opposite to that of other indices. In other words, participants who believed empathy is hard to change decided to donate more money than those who thought empathy is changeable if we endeavor. This finding might be explained in two ways.

First, the filler task we used for the fixed mindset group, the superhero scenario stimulus, might have unintentionally influenced participants' prosocial behaviors. Participants could have been affected by taking a perspective of the scenario's main character and completing missions.

Otherwise, a growth mindset would not be enough to induce advanced prosocial behavior. As prior studies based on *General Learning Model* have suggested, prosocial experiences through video or VR games need to be accompanied to elicit prosocial behaviors in reality (Gentile et al., 2009; Greitemeyer & Osswald, 2010; Rosenberg et al., 2013). Thus, a more active behavioral practice combined with a growth mindset might be necessary to elevate participants' prosocial actions.

Consequently, we decided to utilize a behavioral practice together with a growth mindset to raise participants' empathic abilities and prosocial behaviors - Virtual Reality.

Chapter 3. Study 2

3.1. Method

3.1.1. Participants

A total of 80 university students participated in the second study. They were recruited through the participant recruitment system ('R-point') and student communities of Seoul National University. Fifty-four of them visited the laboratory in person to take part in the experiment and the rest conducted all the procedures online (N_{male} = 33, M_{age} = 21.5, SD_{age} = 2.48). Participants received from 1 to 1.5 R-point credits according to the participation time or ₩15,000 as compensation.

3.1.2. Experiment Design

We conducted the second study with a between-subject design. Participants of the first group (i.e., the "VR-only" group) only experienced a prosocial VR program wearing a VR machine and completed missions. The second group, the "combined" group, both conducted the prosocial VR program and read an article about the malleability of empathy. The "control" group neither experienced the VR program nor read the article. All participants were instructed to leave comments for students who had worries about making friends regardless of which group they were assigned to. Participants in the combined group had to include the contents they read in the article.

Participants were randomly assigned to the three groups. Both the combined and the VR-only groups were composed of 27 individuals each and the control group consisted of 26 participants.

3.1.3. Apparatus

The VR machine participants used during the experiment was 'Meta Quest 2[②]'. The size of the machine is 8.8 * 17.7 inches, with 503g of weight. The machine has a 128GB storage capacity with 16GB RAM. It tracks users' movements with 6 degrees of freedom and lets them view virtual environments at a resolution of 1832*1920 pixels per eye. Users can interact with the environments via two hand controllers. They don't need headphones to listen to the sound as 3D positional audio is built into the headset and glasses are compatible.

The laptop connected to the Meta Quest and where the VR program has been stored was ASUS ROG Zephyrus G15. The laptop's CPU is AMD Ryzen 7 6800HS with Radeon Graphics 3.20 GHz. It contains 16GB of RAM and 512GB of SSD, with an NVIDIA Geforce RTX 3060 graphic card. The laptop runs on Windows 11.

3.1.4. Materials

Malleable Empathy Article Participants in the combined group read an article about the malleability of empathy. The article was the same as the one that participants in the growth mindset group read in Study 1.

Posting Stimuli The same stimuli applied in Study 1 were used in Study 2.

Prosocial VR Program Both the VR-only and the combined group participants experienced a prosocial VR program called *Our Neighbor Hero*. It was created with the VR game engines *Unity*, *Visual Studio*, and *Blender*, targeting both VR machines *Meta Quest 2* and *Oculus Rift*.

We designed the program referring to the superhero VR program from

② https://www.meta.com/kr/en/quest/products/quest-2/tech-specs/

Rosenberg et al. (2013). Considering the limitations of the prior one, we developed a scenario that included direct helping behaviors and involved scenes letting players know the results of their actions to make participants learn prosocial behaviors effectively.

Participants were told that they are superheroes who have to solve the crisis on the roads. When they started to play the program, the first scene was the introduction of a play character and how to use superpowers (psychokinesis) or to move. After perusing all details of how to play, participants entered the room for the hero where three kinds of electronic devices let them know what happened on the road - television, radio, and laptop. When they selected each of the devices with hand controllers, players could go to each scene of the accident. Three accidents the hero had to solve were cleaning up cargo on the road, saving cats trying to cross the road, and supplying emergency power to malfunctioning traffic lights. Participants had to load 10 boxes onto the truck, bring 5 cats to a safety zone, and attach 4 electronic cables to the top of the traffic lights. When completing each mission, citizens (or cats) appreciated players with utterances and emojis in speech bubbles or motions such as applause and salute. Participants could come back to the room for the hero whenever they finished each mission and choose the next one. If all three crises were solved, players clicked a door in the room with the controllers and the whole program ended.

Players controlled their movements and used superpowers with two hand controllers on each hand: joysticks were in charge of participants' movements and trigger buttons were responsible for controlling superpowers. The instructions at the beginning of the program presented which joysticks or buttons to use. Five and a half minutes of time limits were given for each mission and all participants could achieve the missions within the limits. It took about 8 - 12 minutes to complete the program.

All participants completed at least two out of three missions.

3.1.5. Measures

All self-report measures including hypothetical prosocial behavior were the same as those used in Study 1. The internal reliabilities of each scale are presented below.

Malleability of Empathy The internal reliability was .85.

Empathic Motives The internal reliability was .53.

Empathic Effort The internal reliability was .90.

State Empathy The internal reliability was .87.

Trait Empathy The internal reliability was .80.

Prosociality The internal reliability of the Willingness to Help scale was .69. Prosocial Orientation Questionnaire's internal reliability was .82. The total internal reliability of both scales was .83.

Figure 4

The Flow Chart of the Prosocial VR Program Our Neighbor Hero

3.1.6. Procedure

After fully learning how to play and about VR sickness, participants of both the VR-only and the combined groups entered the virtual environment and started to experience the prosocial VR program. The experimenters kept checking whether participants felt sick during the program and let them take a rest if they reported symptoms. It took about 10 minutes to complete. Next, the combined group read the article on the malleability of empathy, while the VR-only group moved directly to the next stage. Then they left comments after reading posts of students who had worries related to interpersonal relationships. Participants in the control group started the experiment by leaving comments without playing the VR program or reading the article. Finally, all participants responded to a series of surveys measuring their empathy and prosociality levels. It took about 15 to 40 minutes for participants to complete all the procedures according to the group they had been assigned to.

3.2. Results

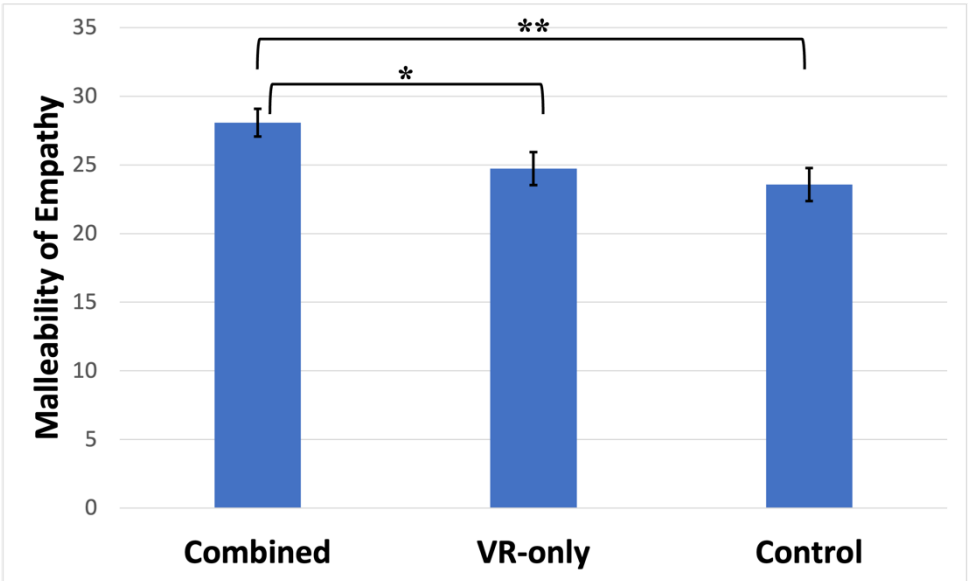
We conducted one-way ANOVAs to examine the effects of mindsets and VR experiences on empathy and prosociality. The means and standard deviations of each score are presented in **Table 2**.

3.2.1. Manipulation Check

According to the Malleability of Empathy score, there was a statistically significant effect of manipulation on participants' mindsets ($F(2, 77) = 4.13$, $p = .02$, $\eta^2 = .10$). Participants in the combined group showed significantly higher scores than those in the control group ($t(51) = 2.82$, $p = .007$, $d = .78$). The combined group also reported significantly higher scores than the VR-only group ($t(52) = 2.13$, $p = .038$, $d = .58$). There was no significant difference between the VR-only group and the control group ($t(51) = .71$, $p = .48$, $d = .19$).

Figure 5

The Scores of Malleability of Empathy by Groups in Study 2



Note. * $p < .05$, ** $p < .01$

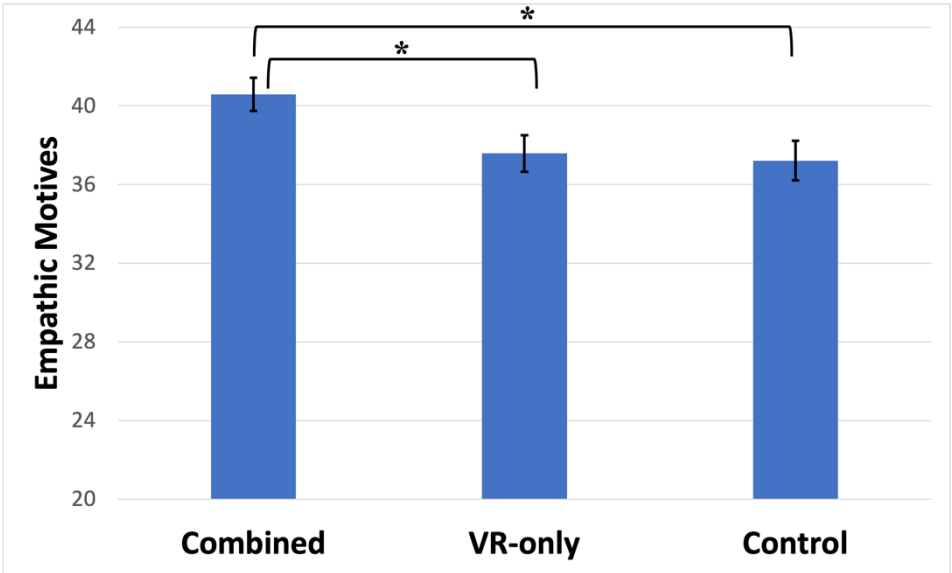
3.2.2. Empathic Motives and Empathic Effort

Empathic Motives A one-way ANOVA revealed significant differences across groups for empathic motives scores ($F(2, 77) = 4.12$, $p = .02$, $\eta^2 = .10$). Participants in the combined group reported significantly higher scores than those in the control group ($t(51) = 2.56$, $p = .011$, $d = .73$). Participants who experienced both VR and growth mindset also showed higher empathic motives than those who played only the VR program and the difference between the two groups was significant ($t(52) = 2.38$, $p = .021$, $d = .65$). However, the analysis revealed no significant difference between the VR-only group and the control group in empathic motives ($t(51) = .37$, $p = .71$, $d = .10$).

Empathic Effort There were no group-based differences in empathic effort scores ($F(2, 77) = .53$, $p = .59$, $\eta^2 = .01$).

Figure 6

The Scores of Empathic Motives by Groups in Study 2



Note. * $p < .05$

3.2.3. Empathy

State Empathy There were no statistically significant differences between groups for state empathy ($F(2, 77) = .26$, $p = .77$, $\eta^2 = .01$).

Trait Empathy A one-way ANOVA did not reveal significant differences across groups in trait empathy scores ($F(2, 77) = .45$, $p = .64$, $\eta^2 = .01$).

3.2.4. Prosocial Attributes

Prosociality There were no group-based differences in prosociality scores ($F(2, 77) = .40$, $p = .68$, $\eta^2 = .01$).

Hypothetical Prosocial Behavior The analysis revealed no significant differences across groups in the amount of money participants decided to donate to the charity ($F(2, 77) = 1.74$, $p = .18$, $\eta^2 = .04$).

Table 2

Means and Standard Deviations of Variables by Groups in Study 2

Group	Malleability of Empathy	Empathic Motives	Empathic Effort	State Empathy	Trait Empathy	Prosociality	Prosocial Behavior
	Mean (*SD*)	Mean (*SD*)	Mean (*SD*)	Mean (*SD*)	Mean (*SD*)	Mean (*SD*)	Mean (*SD*)
Control	23.50 (6.51)	37.08 (5.2)	33.23 (5.77)	54.23 (7.26)	47.85 (8.06)	75.50 (8.40)	15269 (6744)
VR-only	24.74 (6.22)	37.59 (4.81)	32.11 (6.58)	55.41 (7.36)	49.30 (5.89)	77.41 (7.37)	12370 (7540)
Combine	28.07 (5.24)	40.59 (4.43)	33.59 (3.75)	55.41 (5.69)	49.44 (6.08)	77.22 (9.81)	15296 (5377)
Total	25.46 (6.24)	38.44 (5.02)	32.98 (5.46)	55.02 (6.74)	48.88 (6.68)	76.72 (8.52)	14300 (6674)

3.3. Discussion

In Study 2, we investigated the effects of VR experience and a growth mindset on empathy and prosociality. Like Study 1, we first examined whether our manipulation regarding the malleability of empathy was successful. According to the result, there was an overall effect of the manipulation on beliefs about the malleability of empathy. Participants who read the article (the combined group) reported that they believed more in malleable attributes of empathy than those who did not (the VR-only and the control group). Furthermore, there was no significant difference between the VR-only and the control group participants, both of whom did not undertake the mindset intervention.

In addition, we checked if the combination of a growth mindset and prosocial VR experience improved participants' empathic and prosocial attributes (**$RQ_{4\text{-}1}$** and **$RQ_{4\text{-}2}$**).

First, an overall effect on empathic motives was observed across the three groups. Participants who received both the growth mindset and VR experience showed significantly higher motivation to empathize with others than any other group. However, the difference between the VR-only and the control group was not statistically significant.

Conversely, there was no significant difference in empathic effort among the three groups. This result was contrary to that of Study 1, which found a significant difference in empathic effort and not in empathic motives.

There was no significant difference in state empathy, trait empathy, and prosociality among the three groups. In terms of trait empathy, this result was consistent with Study 1's finding, considering that trait empathy is difficult to promote in a short time (Cuff et al., 2016).

Participants in the combined group decided to donate more money to charity than those in the VR-only group, but the effect of interventions on prosocial behavior was not statistically significant. Moreover, participants in the control group showed higher intention of donation than those in the VR-only group. As a result, it may be hard to say that the VR program effectively elicited participants' prosocial behaviors in this study (**RQ_3**).

No impact of prosocial VR experiences on most variables merits further discussion. There could be several reasons for this result. First, the program might be too short to provoke participants' prosocial behaviors. The program experience only took 10 minutes, and we only conducted intervention through a single session. Otherwise, the plot of the program might have caused this outcome. For example, programs with perspective-taking in specific targets (Herrera et al., 2018; Schutte & Stilinović, 2017; Van Loon et al., 2018) successfully improved empathy or prosocial behaviors toward them. On the contrary, others letting participants practice prosocial behaviors showed relatively weak power (Rosenberg et al., 2013). The program in this study, Our Neighbor Hero, also made participants undergo prosocial behaviors in the virtual environment. This design would not be enough to lead to higher levels of empathy and prosocial attributes. In addition, behavioral measures in this study (i.e., the amount of money to donate) might not be appropriate. Rather than a donation, other behaviors, such as related political actions (Herrera et al., 2018) or cooperation games (Van Loon et al., 2018), may be a more accurate method to measure hypothetical prosocial behaviors.

Notwithstanding, the combined group generally reported the highest scores on empathy and prosociality variables, and the interventions significantly influenced participants' empathic motives. Thus, this experiment suggests that the synergistic

effect of cognitive (i.e., mindsets) and behavior training (i.e., VR experience) may enhance one's empathic and prosocial abilities.

Chapter 4. General Discussion

4.1. Summary of Results

In this research, we examined whether a combination of a growth mindset about empathy and a prosocial VR program could increase people's empathic and prosocial abilities.

In Study 1, we assessed the effects of a growth mindset compared to a fixed mindset. Participants who supported the growth mindset on the malleability of empathy showed significantly higher levels of empathic effort and state empathy. However, those who believed in a growth mindset exhibited less prosocial behaviors. We speculated that mindset might primarily affect cognitive and affective aspects of empathy. Therefore, we determined to develop and incorporate the behavioral training method - VR experience - in Study 2 to instigate prosocial attributes.

In Study 2, both the combined and VR-only groups engaged in a prosocial VR program, and only the former group read the article about the malleability of empathy. The control group did not undergo any interventions. We found that participants who experienced the VR program, as well as a growth mindset, generally scored the highest on the scales measuring empathy and prosociality. However, we found no significant difference across the groups in most variables except empathic motives. It is interpreted that experimental designs were not enough to promote participants' empathy and prosocial behaviors. Specifically, a short session of experiments, a plot of the VR program, and behavioral measures should be improved for future studies. Nevertheless, Study 2 implies that the combined intervention of a growth mindset and VR experiences may boost empathy and prosociality as it fostered empathic

motives.

4.2. Theoretical Implications

The outcomes of the current study replicated those of previous ones by and large, strengthening their reliability (Schumann et al., 2014; Weisz et al., 2021; Weisz et al., 2022). People who read the article about empathy's malleable attributes in Study 1 showed higher belief in the malleability of empathy than those who read the article about fixed attributes. The growth mindset prompted an increase in empathy-related capabilities. This pattern was also observed in Study 2. Participants exposed to the article endorsed a growth mindset in empathy and displayed an inclination toward higher empathic and prosocial attributes.

The most significant theoretical implication is that this study primarily probes the outcome of using the combination of a growth mindset and VR experiences. While numerous prior studies have demonstrated that each of these elements independently raises empathy and prosocial actions (Herrera et al., 2018; Ho & Ng, 2022; Rosenberg et al., 2013; Schutte & Stilinović, 2017; Schumann et al., 2014; Van Loon et al., 2018; Weisz et al., 2021; Weisz et al., 2022), no research to date has investigated the concurrent use of both methods. Specifically, the combined group in Study 2 showed significantly higher empathic motives than any other group, which implies the possibility of the integrated intervention in promoting empathy and prosociality. In this regard, the present study has the significance of being the first to examine the potential synergistic effects of a growth mindset and VR experiences.

Moreover, we implemented an online commenting method instead of the letter-writing procedures used by Weisz et al. (2021). The online commenting technique is

a more familiar and common method for expressing empathy among Korean participants, considering the recent social media culture. In two studies, participants who read the mindset article and left imaginary online comments containing the details of the article reported significantly higher scores on the Theories of Empathy scale. These outcomes indicated that this new method was a worthwhile training strategy, letting participants maintain their mindsets during the experiment.

4.3. Practical Implications

The present study showed that people can develop their "empathy muscle" if they make an effort (Zaki, 2019). By endorsing a growth mindset and doing prosocial actions through the VR program, participants reported higher levels of empathy and prosociality. It verifies that empathy education is promising in promoting one's empathy level as prior studies also have indicated (Lam et al., 2011; Weisz et al., 2021).

The current study also implies that empathy education utilizing mindsets and VR experiences plays a critical role in resolving social conflicts. Empathy is a crucial cognitive attribute to get along with others in society. In other words, not only understanding what others feel but also helping them based on provoked empathy is necessary for socializing with others (Zaki, 2019). Hence, empathy towards others with prosocial actions would be an appropriate solution for the conflicts prevalent in our society (de Wied et al., 2007; Klimecki, 2019). Considering prior studies also figured out that manipulating mindsets to resolve conflicts between two hostile groups was effective (Halperin et al., 2011), this study shows the possibility of elevating empathy and prosocial behaviors toward outgroup members using both mindsets and VR experiences.

In addition, these techniques also seem to help lonely people, especially isolated teens or young adults. Loneliness in the young generation is a serious social problem these days (Cacioppo et al., 2015; Keller et al., 2020). By training empathy and prosocial behaviors with a growth mindset and VR experiences, isolated people can learn how to socialize with others. In this respect, we expect the current study will be a cornerstone for solving social concerns such as conflicts and loneliness.

Furthermore, the two methods in this study can be easily applied in our daily lives. We can endorse a growth mindset on empathy without difficulty, just by thinking that our empathic ability can develop and applying what we've learned when advising others (e.g., leaving comments in the present study). This study also suggests how Virtual Reality can be applied to education. As VR technologies are widely available, people can encounter a variety of situations without physical constraints more easily than before (Ahn et al., 2014; Bailenson, 2018; Markowitz et al., 2018). In this light, people can go into scenes where others need help and practice prosocial actions through VR. Moreover, not only adults who are the main targets of the present study but also adolescents or younger children are expected to gain benefits from VR empathy education.

4.4. Limitations and Future Research

There are some limitations in the current study. First, participants of the fixed mindset group in Study 1 did the filler task, while those in the growth mindset group did not. The filler task might unintentionally affect their empathic and prosocial attributes since the task includes the contents of a superhero which is highly related to prosociality. Thus, it is required to design the fixed mindset group without any filler task and compare the pure effect of growth vs. fixed mindsets in future research.

Moreover, it would have been better if we repeatedly measured participants' empathy and prosocial scores. In other words, comparing the scores before and after interventions would make it possible to investigate the precise effects of interventions. Meanwhile, a longitudinal study would be necessary to understand the continuous impacts of a growth mindset and VR experiences on empathy and prosociality. It seems that a long-term study will also resolve the trait empathy setback.

The current study did not explore the interaction effect of VR experience and empathy mindsets. Future studies should analyze the interaction effect of the two methods in improving empathy and prosocial behaviors. Furthermore, remarkable findings could be induced if mediation or moderation analysis is executed between empathic motives or effort and other empathy-related attributes.

Also, Study 2 had a small sample size for each group. Future studies could be improved by recruiting more participants. In addition, experiments using VR with neurobiological technologies (e.g., EEG) can also be followed. Measuring participants' neural or bio-signals while in virtual environments will broaden the fields of VR-related studies.

Chapter 5. Conclusion

The current study investigated how to improve empathy and prosocial actions. The first study discovered that a growth mindset, the belief that empathy is changeable if people make efforts, led to higher empathy and prosociality than a fixed mindset. Reading an article about the malleability of empathy and keeping it in mind while leaving comments to those who need advice contributed to continuously endorsing the mindsets, which caused a significant rise in empathic effort and state empathy. Study 2 implemented the prosocial VR program of being a superhero and solving a series of crises on the road to overcome the limitations of Study 1, which did not adopt behavioral training. The results showed that conducting the integrated technique of a growth mindset and VR experiences significantly influenced empathic motives. The present study suggests that a growth mindset is effective in promoting empathy and prosociality. In addition, the results indicate that implementing both a cognitive intervention and a behavioral one - a growth mindset and VR experiences - is vital in education for elevating one's empathic and prosocial levels. Future research, conducted with an advanced experimental design, more sophisticated analysis, and larger samples, could result in better outcomes.

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Appendix

Appendix 1: Malleable and Fixed Empathy Articles (Schumann et al., 2014; Weisz et al., 2021)

공감 유연성 이론

공감 능력은 변화 가능하며 발전될 수 있다

10년 전 같은 고등학교를 다녔던 친구를 최근 우연히 만났다. A는 타인의 입장을 고려하거나 공감하지 않는 부류의 사람이었다. 그랬던 그가 사회복지사로 지역사회에 활발히 봉사하고 있다는 걸 알게 되었을 때 매우 놀라웠다. 180도 달라진 A를 보니 어떻게 이렇게 많이 변할 수 있었는지 궁금했다.

공감 능력은 변할 수 있을까?

공감 능력이 바뀔 수 있는지에 대한 전문가들의 의견을 들어보기 위해 하버드대 공감 연구실에 방문했다. 다니엘 로렌스 박사는 "공감은 변화하기 쉽고 시간이 지남에 따라 영향을 받을 수 있다. 공감은 평생에 걸쳐 안정적인 특질이 아니므로 발달시키고 성장시킬 수 있다."고 결론지었다. 그는 지난 25년간 추적한 800명의 참여자들 중 오직 극소수에게서만 전반적인 공감 수준이 연구 초기 수준과 동일했음을 보여주었다. 왜일까? 그는 "사람들은 일생 동안 배우고 성장한다. 공감 또한 변할 수 있다. 쉽지 않지만, 만약 사람들이 원한다면, 다른 사람들에게 얼마나 많이 공감할지를 스스로 형성할 수 있다. 어느 누구의 공감 능력도 바위처럼 단단하지 않다." 라고 설명한다.

공감 능력은 어떻게 변할까?

1965년, 헨리 지루는 흥미로운 개입 프로그램을 실시했다. 이는 과거 학교 폭력 행위를 보였거나 학교, 경찰에 의해 가해 학생이 될 위험성이 있다고 판단된 공감 능력이 낮은 청소년들을 대상으로 설계되었다. 메사추세츠에 거주하는 250명의 소년들이 평균 5년간 꾸준히 참여하였다.

이 프로그램의 주된 질문은 '이 아이들이 타인에 대해 공감하는 법을 배워, 다른 아이들을 괴롭히는 것을 멈출 수 있는가?' 였다. 프로그램이 지속되는 5년 동안 사회복지사들은 이들에게 타인의 입장이 되어보고, 타인의 관점에서 세상을 바라보며, 타인이 느끼는 것을 느끼도록 가르쳤다.

결과는 고무적이었다. 프로그램에 참여하지 않은 청소년들 중 60% 이상에 학교 폭력 가해자라는 꼬리표가 붙은 반면, 프로그램에 참여한 청소년들 중에서는 오직 17%에게만 꼬리표가 붙었다. 사실, 프로그램에 참여한 대다수가 현재에 이르러서도 공감 능력이 매우 뛰어나다는 것이 가족과 친구들에 의해 확인되었다.

그렇다면 무엇이 그들의 공감 능력을 변화시켰을까? 성인이 된 후 실시한 인터뷰에서 참여자들은 공감이 바뀔 수 있다고 믿었던 덕분에 공감 능력이 성장하였다고 답했다. 한 참여자는 다음과 같이 말했다: "누군가에게 공감하고 그들의 관점에서 바라보는 것이 어려울 때마다, 저는 프로그램에서 배운 것을 떠올렸습니다. '괜찮아, 공감 능력은 바뀔 수 있어. 자연스럽게 공감하지

못한다고 해서 아예 공감하지 못하는 것이 절대 아니야.'"
위 연구 결과는 공감 능력이 변화할 수 있으며, 때로는 변화하기 어려울 수도 있다는 것을 이해하는 것이야말로 공감 능력을 성장시키는 중요한 포인트라는 것을 보여준다.

마무리

추측하건대 내 동창 A는 몇 년 동안 공감 능력을 성장시키는 훈련을 하지 않았을까 싶다. 이제 사회복지사로서, 그는 "우리 모두 타인에 공감하는 능력을 변화시킬 수 있다"라는 메시지를 다른 이들에게 전달하고 있지 않을까.

공감 고정 이론

공감 능력은 석고처럼 시간이 지나도 꽤나 안정적이다

10년 전 같은 고등학교를 다녔던 친구를 최근 우연히 만났다. A는 타인의 입장을 고려하거나 공감하지 않는 부류의 사람이었다. 그랬던 그가 어려운 처지의 주택 소유자들의 집을 압류하는 담보 대부업자라는 사실을 알게 되었을 때 전혀 놀랍지 않았다. 달라지지 않은 A를 보니, 왜 공감할 줄 모르는 인물형에서 조금도 벗어나지 못했는지 궁금했다.

공감 능력은 변할 수 있을까?

공감 능력이 바뀔 수 있는지에 대한 전문가들의 의견을 들어보기 위해 하버드대 공감 연구실에 방문했다. 다니엘 로렌스 박사는 "공감은 다소 고정적이며 시간이 지남에 따라 같은 경로로 꾸준히 성장한다. 공감 능력이 초기에는 유동적일 수 있지만, 초반 몇 년 후에는 하나의 일관된 공감 프로파일로 굳어지는 것으로 보인다."고 결론지었다. 그는 지난 25년간 추적한 800명의 참여자들 중 오직 극소수에게서만 전반적인 공감 수준이 상당 부분 변화하였다는 결과를 보여주었다. 왜일까? 그는 "대부분의 경우, 공감 능력은 아주 어린 나이에 석고 반죽처럼 굳어져서 다시 부드러워질 수 없다. 우리가 공감 능력을 변화시키고 다른 사람들에게 얼마나 많은 공감을 느낄지를 형성하고 싶어도, 대개는 성공하지 못한다. 공감 능력은 바위처럼 꽤나 딱딱하다." 라고 설명한다.

외부의 영향이 공감 능력을 변화시킬 수 있을까?

1965년, 헨리 지루는 흥미로운 개입 프로그램을 실시했다. 이는 과거 학교 폭력 행위를 보였거나 학교, 경찰에 의해 가해 학생이 될 위험성이 있다고 판단된 공감 능력이 낮은 청소년들을 대상으로 설계되었다. 메사추세츠에 거주하는 250명의 소년들이 평균 5년간 꾸준히 참여하였다.

이 프로그램의 주된 질문은 '이들이 타인에 대해 공감하는 법을 배워, 다른 아이들을 괴롭히는 것을 멈출 수 있는가?' 였다. 프로그램이 지속되는 5년 동안, 사회복지사들은 이들에게 타인의 입장이 되어보고, 타인의 관점에서 세상을 바라보며, 타인이 느끼는 것을 느끼도록 가르쳤다.

결과는 실망스러웠다. 학교 폭력의 가해자이거나 혹은 그럴 위험이 높지만 프로그램에 참여하지 않았던 청소년들과 비교하였을 때, 프로그램에 참여한 이들 또한 똑같이 학교 폭력 가해자라는 꼬리표가 붙을 가능성이 높았다. 사실, 이 프로그램에 참여한 대다수가 현재에 이르러서도 여전히 공감 능력이 매우 낮다는 것이 가족과 친구들에 의해 확인되었다.

성인이 된 후 실시한 인터뷰에서 참여자들은 별다른 도움이 되지 못했음에도

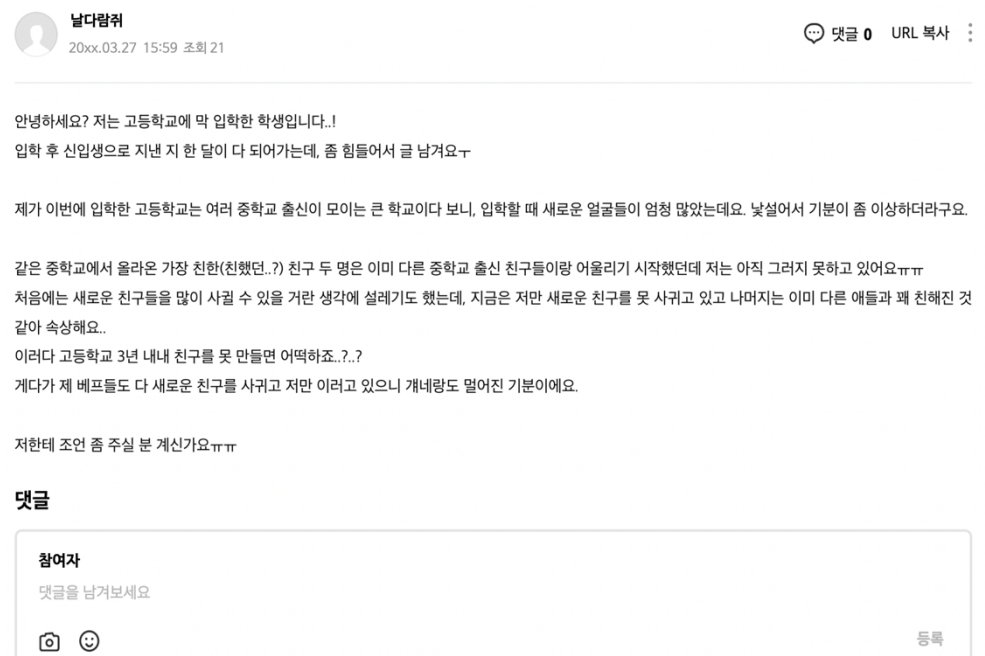
불구하고 프로그램 참여 경험에 대해 애틋한 기억을 가지고 있다고 답했다. 한 참여자는 다음과 같이 말했다: “훌륭한 프로그램이었다. 내게 도움이 되는 것들을 많이 배울 수 있었다. 그 프로그램이 나에게 다른 이들의 입장이 되어보는 것을 가르쳐주기는 했지만, 나는 아무래도 본디 타인의 감정에 대해 그러한 감수성을 갖고 있는 것 같지 않다.”

위 연구 결과는 공감 능력은 생애 초기에는 학습될 수 있지만, 나중에는 이를 성장시키려 노력하더라도 바꾸기 힘들다는 것을 보여준다.

마무리

내 동창 A의 공감 능력이 시간이 지나도 변하지 않았다는 것은 전혀 놀라운 일이 아니다. 설령 그가 다른 이들에게 공감하는 법을 배우고자 노력했더라도, 부족한 공감 능력은 이미 그의 일부이기 때문에 성공하기 어려웠지 않을까.

Appendix 2: Posting Stimuli (Weisz et al., 2021)



Appendix 3: Superhero Scenario

도로 위의 히어로

당신은 도로 위의 히어로! 도로의 안전을 책임지고 있어요. 어라! 지금 마침 당신 앞의 도로들에 발생한 사건들이 있네요. 염력을 이용해 도로의 혼란을 정리하고, 시민들이 안전하게 이동할 수 있도록 도와주세요!

A) 트럭에서 쏟아진 화물 정리하기

오늘도 활기찬 도로. 당신은 평화로운 도로의 전경을 내려다보고 있어요. 다만 조금 걱정인 것은 차들 사이로 보이는 유난히 짐을 많이 실은 트럭이에요. 불안하다 싶더니, 아이고, 결국 트럭에 적재된 상자들이 도로 위로 우수수 떨어지고 마는군요. 예기치 못한 사고로 도로는 마비되고 말았어요. 다행히 다친 시민들은 없지만, 그래도 명색이 도로 위의 히어로인 당신이 이 상황을 지켜보고 있을 수만은 없겠죠? 지금 바로 상자들을 정리하러 도로로 내려가는 당신. 당신의 염력으로 저 멀리 떨어진 상자들도 손쉽게 가져와 트럭에 다시 쌓을 수 있었어요. 도로 위에 마구잡이로 흐트러져 있던 상자들을 하나씩 다시 트럭에 차곡차곡 정리하고 나니 도로가 뻥 뚫렸네요! 시민들의 환호 소리가 들리나요? 모두 당신에게 고마워 하고 있어요!

B) 길 위의 동물 구조하기

어슴푸레한 새벽. 많지는 않지만 새벽부터 헤드라이트를 켜고 부지런히 움직이는 차들이 군데군데 보이는군요. 이 고요하고 잔잔한 풍경에 갑자기 도로로 뛰어드는 고양이! 덤불 속에 숨어 눈만 빛내던 녀석이 결국은 나와버렸어요. 이럴수가. 빨리 고양이를 구하지 않으면 큰 사고가 날 것만 같아요. 저 멀리 고양이를 미처 보지 못한 파란 승용차가 빠르게 달려오고 있거든요. 도로 위의 히어로인 당신이 이번에도 재빠르게 이동해서 해결하는군요! 도로 근처로 이동한 당신은 염력을 사용해 차에 치일 뻔한 고양이를 재빨리 낚아채고는 건너편으로 이동시켰네요. 정말 다행이에요! 고양이도 이런 당신에게 고마웠는지 조심스레 다가와 사랑스러운 표정으로 당신을 올려다보는군요. 에이, 가만히 있지만 말고 고양이를 한 번 쓰다듬어 주는 건 어때요?

C) 신호등 비상 전원 공급하기

차들이 한창 붐빌 점심 시간대, 당신도 커피 한 잔 하며 사거리에 별 문제는 없는지 내려다보고 있던 참이었어요. 그런데 갑자기, 신호등 제어기에서 파바박 불꽃이 튀어요. 앗, 도로 위의 모든 신호등이 꺼져버렸어요! 차도, 보행자도 사고 없이 이동하고 횡단보도를 건너려면 신호등이 필수인데 말이죠. 당신은 재빨리 도로로 내려가 우선은 고장 난 신호등을 살펴봤어요. 급한 대로 전선을 연결해 신호등에 비상 전원이라도 공급해야겠어요. 높은 신호등에 염력으로 플러그를 꽂아볼 수 있겠다는 생각이 드는 당신! 바로 실행에 옮겨 봅니다. 네 신호등에 서로서로 비상 전원이 공급될 수 있도록 전선을 연결하고 나니 다시 불이 들어와요. 길을 건너려 했던 보행자들도, 차 안에서 발을 동동 구르고 있던 운전자들도 모두 당신에게 고맙다고 인사하네요!

Appendix 4: Theories of Empathy Scale (Schumann et al., 2014; Weisz et al., 2021)

다음의 문항들을 읽고 자신의 생각과 일치하는 답변을 선택해주시기 바랍니다.

1 전혀 동의하지 않음	2 동의하지 않음	3 다소 동의하지 않음	4 보통	5 다소 동의함	6 동의함	7 매우 동의함

1. 한 사람의 공감 수준은 매우 기본적인 성질로, 크게 변화할 수 없다.
2. 한 사람이 공감적인지 아닌지는 그 사람의 성격에 깊이 배어 있다. 이는 크게 변화할 수 없다.
3. 사람들은 그들이 다른 이들에게 얼마나 많은 공감을 느낄지를 변화시킬 수 없다. 어떤 이들은 매우 공감적이며 어떤 이들은 그렇지 않다. 그리고 그들은 이를 크게 바꿀 수 없다.
4. 어떤 사람이든 간에, 그들은 항상 그들이 얼마나 공감적인지 그 정도를 바꿀 수 있다.
5. 사람들은 다른 사람들에게 일반적으로 얼마나 많이 공감하는지를 항상 바꿀 수 있다.
6. 누구나 자신이 얼마나 공감하는지를 변화시킬 수 있다.

Appendix 5: Empathic Motives Questionnaire (Schumann et al., 2014; Weisz et al., 2022)

다음의 문항들을 읽고 자신과 일치하는 답변을 선택해주시기 바랍니다.

1 전혀 동의하지 않음	2 동의하지 않음	3 다소 동의하지 않음	4 보통	5 다소 동의함	6 동의함	7 매우 동의함

1. 다른 사람에게 공감을 느끼는 것은 좋은 일이다.
2. 다른 사람에게 공감을 느끼는 사람이 공감을 느끼지 않는 사람보다 더 친절하다.
3. 다른 사람에게 공감을 느끼는 것은 좋지 않다.
4. 다른 사람에게 공감을 느끼는 것은 무서울 수 있다.
5. 나는 다른 사람에게 공감을 느끼기 위해 개인적인 고통을 기꺼이 감수한다.
6. 나는 다른 사람에게 공감을 느끼려 노력한다.
7. 나는 종종 다른 사람에게 공감을 느끼는 것으로부터 이익을 얻는다.
8. 나는 다른 사람에게 공감을 느끼는 것으로 인해 고통받는다.

Appendix 6: Empathic Effort Questionnaire (Schumann et al., 2014)

다음의 문항들을 읽고 자신의 생각과 일치하는 답변을 선택해주시기 바랍니다.

(상대방 = 게시글 작성자)

댓글을 달면서,

1 전혀 사실이 아님	2 사실이 아님	3 다소 사실이 아님	4 보통	5 다소 사실임	6 사실임	7 매우 사실임

1. 나는 상대방의 감정을 이해하려고 노력했다.
2. 나는 상대방의 입장이 되려고 노력했다.
3. 나는 상대방의 관점에서 보려고 노력했다.
4. 나는 상대방에 대해 공감을 느끼려고 노력했다.
5. 나는 상대방의 관점에 대해 배우려고 노력했다.
6. 나는 상대방이 느끼는 감정을 느끼려고 노력했다.

Appendix 7: State Empathy Scale (Shen, 2010)

다음의 문항들을 읽고 자신과 일치하는 답변을 선택해주시기 바랍니다.

(상대방 = 게시글 작성자)

1 전혀 아니다	2 아니다	3 다소 아니다	4 보통	5 다소 그렇다	6 그렇다	7 매우 그렇다

1. 상대방의 감정은 진실했다.
2. 나는 상대방과 같은 경험을 할 수 있었다.
3. 나는 상대방의 감정을 느낄 수 있었다.
4. 나는 상대방의 관점을 이해할 수 있었다.
5. 나는 상대방이 처한 상황을 인식할 수 있었다.
6. 나는 상대방이 어떤 일을 겪었는지 이해할 수 있었다.
7. 본인이 처한 상황에 대한 상대방의 반응은 충분히 이해 가능한 수준이었다.
8. 댓글을 달 때, 나는 완전히 몰입했었다.
9. 나는 상대방의 상황에 동화될 수 있었다.
10. 나는 상대방과 나를 동일시 할 수 있었다.

Appendix 8: Interpersonal Reactivity Index – The Short Korean version (Davis, 1980; Park, 2017)

다음의 문항들을 읽고 자신과 일치하는 답변을 선택해주시기 바랍니다.

1 전혀 동의하지 않음	2 동의하지 않음	3 보통	4 동의함	5 매우 동의함

1. 나는 남을 비난하기 전에 내가 만일 그 사람의 입장이었다면 어떻게 느낄 것인가를 생각해보려고 노력한다.
2. 나는 어떤 문제에 대해 일단 내가 옳다고 확실히 믿으면 그 후로는 다른 사람의 말을 귀담아 듣지 않는다.
3. 때때로 나는 친구들의 입장에서 보면 어떨 것인가를 상상해봄으로써 그들을 더 잘 이해하려고 노력한다.
4. 나는 모든 질문에는 두 가지 측면이 있다고 믿고 두 측면 모두를 살펴보려고 노력한다.
5. 나는 때때로 상대편의 입장에서 사태를 보는 것은 매우 어렵다고 생각한다.
6. 나는 어떤 결정을 내리기 전에 다른 의견을 가진 사람 입장에서도 살펴보려고 노력한다.
7. 누군가에게 화가 날 때 나는 대개 잠시나마 그의 입장에 서보려고 노력한다.
8. 누군가가 이용당하고 있는 것을 보면 나는 그를 보호해주고 싶은

마음이 생긴다.

9. 나는 누군가가 억울하게 취급 당하는 것을 보아도 그들에게 동정심이 별로 일지 않는 때가 더러 있다.

10. 나보다 불행한 사람들을 볼 때 자주 그를 염려하는 따뜻한 감정이 일어난다.

11. 나는 스스로를 매우 부드러운 마음을 가지고 있는 사람이라고 생각한다.

12. 나는 다른 사람들에게 문제가 있을 때에 그들에 대해 별로 마음 아파하지 않는 경우가 있다.

13. 다른 사람들의 불행이 나를 크게 혼란에 빠뜨리는 적은 별로 없다.

14. 나는 주위에서 일어나는 일들을 보고 자주 깊이 감동한다.

Appendix 9: Willingness to Help (Peng et al., 2010)

다음의 문항들을 읽고 자신과 일치하는 답변을 선택해주시기 바랍니다.

1 전혀 없음	2 없음	3 다소 없음	4 적당히	5 다소 많음	6 많음	7 매우 많음

1. 게시글 속 학생(들)의 문제를 해결하는 것을 돕기 위해 그의 가족이나 친구와 이야기해볼 의향이 얼마나 있는가?
2. 게시글 속 학생(들)과 같이 대인관계 문제로 힘들어하는 청소년을 위한 멘토링 캠프가 열린다면, 해당 캠프의 원활한 운영을 위해 돈을 기부할 의향이 얼마나 있는가?
3. 게시글 속 학생(들)과 같이 대인관계 문제로 힘들어하는 청소년을 위한 멘토링 캠프가 열린다면, 해당 캠프에서 봉사할 의향이 얼마나 있는가?

Appendix 10: Prosocial Orientation Questionnaire (Cheung et al., 1998; Rosenberg et al., 2013)

다음의 문항들을 읽고 자신과 일치하는 답변을 선택해주시기 바랍니다.

1 전혀 아니다	2 거의 아니다	3 가끔 그렇다	4 자주 그렇다	5 항상 그렇다

1. 나는 공부할 때 다른 학생들이 나와 함께 하는 것을 환영할 것이다.
2. 나는 도움이 필요한 사람들을 돕기 위해 시간과 돈을 쓸 것이다.
3. 나는 친구들이 말다툼 하거나 싸우는 것을 막으려고 노력할 것이다.
4. 나는 자선단체가 나의 도움을 필요로 한다면 그들을 돕기 위해 자원할 것이다.
5. 나는 가족들이 도움을 필요로 하면 도울 것이다.
6. 나는 낯선 사람이 무언가를 두고 (놓고) 가는 경우, 그에게 말해줄 것이다.
7. 나는 내 물건을 다른 사람들과 나눌 때 행복함을 느낀다.
8. 나는 장애가 있는 (예: 휠체어를 사용하는) 사람들을 도울 의향이 있다.
9. 나는 친구들이 유난히 잘 할 때면 질투를 느낀다.
10. 나는 학교에서 공부를 잘 못하는 반 친구 (혹은 과 동기)들을 무시한다.
11. 나는 부모님을 기쁘게 해드리는 일을 한다.
12. 나는 내 친구들을 도와주는 것을 좋아한다. (예: 친구를 위해

도서관에 책을 반납하는 것)

13. 나는 친구들에게 문제가 생겼을 때 도와줄 의향이 있다.

14. 나는 친구나 가족을 돕기 위해 내가 좋아하는 것을 포기할 의향이 있다.

15. 나는 지하철이나 버스 안에서 도움이 필요한 사람에게 자리를 양보할 것이다.

16. 나는 집에서 집안일을 도울 의향이 있다.

17. 나는 나를 도와주지 않았던 사람은 돕지 않을 것이다.

Appendix 11: Hypothetical Prosocial Behavior (Carlson & Zaki, 2022; Rathje et al., 2021)

다음의 지시문을 읽고 최대한 생생하게 상상하며 아래의 문항에 응답해주시기 바랍니다.

“설문이 종료된 후 당신은 원래 약속되어 있던 보상에 보너스로 2만원을 더 받게 되었습니다. 만약 아래의 자선 단체에 익명으로 기부할 수 있는 선택지가 주어진다면, 당신은 2만원 중 얼마를 기부할 의향이 있습니까?”

초록우산 어린이재단은 74년 동안 빈곤과 질병으로 고통받는 아동 및 청소년을 도우며 아동권리 옹호활동을 지속해오고 있는 대한민국 아동옹호 대표기관입니다. 1948년 문을 연 초록우산 어린이재단은 자립 성장, 보육, 학습 및 재능 개발, 의료, 주거의 분야에 걸쳐 아동과 청소년이 선택하지 않은 자신의 환경 때문에 기본적인 권리를 박탈당하는 일이 없도록 성장기간 동안 촘촘한 경제적 지원을 제공하고 있습니다. 또한, 다양한 형태의 폭력으로부터 이들을 보호하고 경제적 어려움에 직면한 아이들을 지원함으로써 자신의 재능과 가능성을 마음껏 펼쳐나갈 수 있도록 지원하고 응원합니다. 나아가 아동과 청소년이 권리 주체자로 성장하고 지역사회가 이들의 권리를 존중하고 지켜나갈 수 있도록 교육합니다.

(선택 범위: 0원 ~ 2만원, 1천원 단위로 답변 가능.)

국문 초록

사회적 갈등이 최근 심각한 문제로 부상하며 문제를 해결할 방안으로 공감과 친사회성이 대두되고 있다. 공감적, 친사회적 특성을 고취시키는 데 성장 마인드셋과 가상현실 (VR) 경험을 각각 독립적으로 사용하는 것이 효과적이었음이 선행 연구를 통해 밝혀졌다. 그러나 성장 마인드셋과 VR 경험의 시너지 효과에 대한 연구는 부족한 실정이다. 이에 본 연구는 성장 마인드셋과 VR 경험이 공감과 친사회성에 영향을 주는지에 대해 알아보고자 실시되었다. 연구 1에서는 성장 마인드셋과 고정 마인드셋이 각각 공감과 친사회성 관련 지표들에 미치는 영향을 비교하였다. 참여자들은 각 종류의 마인드셋에 대한 지시문을 읽고 타인을 위로하는 댓글을 남기는 절차를 실시했다. 연구 2에서는 성장 마인드셋과 VR 경험의 시너지 효과를 살펴보고자 두가지를 함께 사용하는 통합 개입을 적용하였으며, 친사회적 VR 프로그램을 개발하여 참여자들이 실험 과정에서 직접 체험할 수 있도록 하였다. 참여자들이 특정 유형의 마인드셋을 지지하게끔 사용된 조작은 연구 1과 2 모두에서 효과적이었던 것으로 밝혀졌다. 연구 1에서 성장 마인드셋을 지지한 참여자들은 고정 마인드셋을 지지한 참여자들보다 유의미하게 높은 수준의 공감적 노력과 상태 공감을 보고하였다. 이와 더불어 성장 마인드셋 집단은 더 높은 공감 동기, 특질 공감, 친사회성 점수를 보고하였으나 두 집단 간의 차이는 통계적으로 유의미하지 않았다. 연구 2에서, 통합 집단에 소속된 참여자들은 VR만 사용한 집단과 통제

집단에 소속된 참여자들에 비해 유의미하게 높은 공감 동기 점수를 보고하였다. 통합 집단은 나머지 두 집단보다 높은 공감적 노력과 특질 공감 점수, 친사회적 행동을 보여주었으나 집단 간 차이는 유의미하지 않았다. 본 연구는 성장 마인드셋을 견지하는 것이 공감과 친사회성을 촉진하는 데 있어 효과적인 방식임을 암시한다. 나아가, 인지적 훈련 방식 (성장 마인드셋)과 행동적 방식 (VR 경험) 모두를 사용하는 것이 공감 교육에 중요하다는 것을 보여준다.

주요어 : 공감, 친사회성, 성장 마인드셋, 가상현실

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