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Perceived physical appearance and life satisfaction: A moderated mediation model of self-esteem and life experience of deaf and hearing adolescents

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ABSTRACT

In this study, we investigated the relationship between perceived physical appearance and life satisfaction, and the role of self-esteem as mediator and life experience as moderator of the relationship in deaf and hearing adolescents. 118 Chinese deaf adolescents (55.1% male; mean age = 15.12 years, standard deviation [SD] = 2.13) from 5 special education schools and 132 Chinese hearing adolescents (53.8% male; mean age = 13.11 years, SD = .85) completed anonymous questionnaires regarding perceived physical appearance, self-esteem, and life satisfaction. Perceived physical appearance, self-esteem, and life satisfaction were significantly and positively associated with each other. Moreover, self-esteem partially mediated the relationship between perceived physical appearance and life satisfaction; however, this indirect link was weaker for deaf adolescents than it was for hearing adolescents. Implications of the findings and future research directions are discussed, as are potential interventions that can be applied to increase subjective well-being in deaf adolescents.

Introduction

Life satisfaction is a subjective evaluation of the overall quality of life. Negative life satisfaction has been associated with emotional disturbance (e.g., Griffin & Huebner, 2000), eating disorders (e.g., Halvorsen & Heyerdahl, 2006) and suicide (e.g., Valois, Zullig, Huebner, & Drane, 2004). Recently, interest in investigating this construct among children and adolescents has increased because of the disparity in mental health and educational outcomes associated with varying degrees of life satisfaction. However, most studies have evaluated general samples of students, overlooking how young people with disabilities perceive the quality of their lives.

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Researchers investigating life satisfaction are generally concerned with how and why people experience their lives in positive ways. However, little has been determined regarding the effects such as perceived physical appearance and self-esteem exert on life satisfaction in deaf adolescents, or how the effect differs between deaf and hearing adolescents. Thus, the present study examined the interrelationship between perceived physical appearance, self-esteem, and global life satisfaction among deaf and hearing adolescents. That is, according to a proposal by Sheridan (2001), we focused on the possible moderating effect life experience of deaf and hearing adolescents exerts on the relationship.

Perceived physical appearance, self-esteem, and life satisfaction among adolescents with disabilities

Body image is a crucial component of the self and includes perceived physical appearance. The considerable social, cognitive, and physical changes young people experience during adolescence and the emphasis society places on appearance have contributed to a heightened awareness of physical appearance-related concerns among adolescents (e.g., Ata, Ludden, & Lally, 2006) that have transcended gender and cultural boundaries. In addition, self-perceived physical appearance is increasingly critical because of its potential to cause severe mental and physical health problems, such as eating disorders (Peat, Peyerl, & Muehlenkamp, 2008), depression (Stice, Hayward, Cameron, Killen, & Taylor, 2000), and emotional distress (Johnson & Wardle, 2005).

Young people with visible disabilities have difficulty forming positive perceptions of their bodies because of the negative images and beliefs they perceive about their disabilities. For example, young people with spina bifida, particularly girls, greatly value physical appearance and are therefore at greater risk of lower self-worth (Appleton et al., 1994). However, hidden disabilities such as deafness are not readily apparent to others, and therefore, many assume that body image problems for deaf people are not as acute as they are for people with visible disabilities. Studies have indicated that self-esteem varies according to disability identification (i.e., hidden or visible disabilities) (Nario-Redmond, Noel, & Fern, 2013). People with hidden disabilities encounter unique challenges when reappraising and modifying self concept or utilizing strategies to preserve the emotional and physical self (Fitzgerald & Paterson, 1995). Similar to hearing adolescents, deaf adolescents primarily develop the self through meaningful contact with adults, such as parents and teachers, and peers in the public domain, such as classmates (Harter, 1999). Because communication problems may hinder them from developing a strong social network outside of their family (Calderon & Greenberg, 2003), developing a sense of self is particularly complicated for deaf adolescents.

Numerous scholars have identified a variety of self-related problems experienced by deaf people, such as developing low levels of self-control and personal autonomy (e.g., Calderon & Greenberg, 2003; Harvey, 2003), engaging less in self-initiated activities, exhibiting limited faith in personal capabilities (Meadow-Orlans, 1990), and feeling inferior to hearing people (Klansek-Kyllo & Rose, 1985). In addition, hearing impairment is closely linked to lower levels of mental health (Tambs, 2004) and well-being (e.g., Theunissen et al., 2014; Weisel & Kamara, 2005).

Although previous studies have determined that deaf people typically have lower self-esteem than do hearing people (Bat-Chava, 1993), deaf adolescents have a more positive self-esteem if they have a rich sense of language and heritage through belonging to a vital cultural group (Bat-Chava, 1993). A positive affiliation with the deaf community is a strong protective factor during the development of self-esteem (Jambor & Elliott, 2005). Percy-Smith, Cayé-Thomasen, Gudman, Jensen, and Thomsen (2008) suggested that cochlear implants enabled children to participate actively in the hearing community and score the same as or higher than their hearing peers on surveys regarding self-esteem and social well-being.

Unlike in the United States and numerous other countries in which the majority of deaf children and adolescents are educated in public schools, in China, children with special needs are sent to special education schools (Yang & Wang, 1994). Although the Learning in the Regular Classroom movement gained popularity in the early 1990s (Ellsworth & Zhang, 2007), most Chinese parents prefer that their deaf children attend completely segregated boarding schools or day school programs because Chinese general education classrooms have large class sizes, lack trained special education teachers, and are full of students who do not understand how to interact with students with disabilities (Kritzer, 2012); that is, students with disabilities in Chinese public schools are given the opportunity to go to school, but not the right to be equally educated. Therefore, Chinese parents, educators, and psychologists assume that deaf children and adolescents can benefit more from attending a special education school. For example, in special education schools, students can develop more effective communication skills and adjust psychosocially in the positive environment. In addition, deaf students can gain more comfort and emotional security from relationships with other deaf peers than from relationships with hearing peers (Stinson, Whitmire, & Kluwin, 1996). However, whether Chinese deaf adolescents in special educational environments contend with fewer challenges caused by their disability remains unclear. To address this issue, this study compared the perceived physical appearance, self-esteem, and life satisfaction experienced by Chinese deaf adolescents in special education schools and those experienced by hearing adolescents in public schools. If deaf adolescents indeed face fewer challenges in special education schools, their perceived physical appearance, self-esteem, and life satisfaction is comparable to that of the hearing students.

Relationships between life satisfaction, self-esteem, and perceived physical appearance

Previous research has indicated that life satisfaction is strongly associated with self-esteem. For example, Moksnes and Espnes (2013) determined that self-esteem positively influenced the life satisfaction of adolescents, regardless of age or

sex. In addition, findings from a study of immigrant and rural adolescents suggested a positive relationship existed between self-esteem and life satisfaction (Neto, 2001). Thus, self-esteem is among the strongest predictors of life satisfaction.

Moreover, recent research has emphasized the mediating effect self-esteem exerts on the links between life satisfaction and its relevant variables. Kapikiran (2013) disclosed that self-esteem partially mediated the relationship between life satisfaction and loneliness among early adolescents in Turkey. Joshanloo and Afshari (2011) determined that self-esteem mediated the influence conscientiousness and agreeability exerted on life satisfaction; the effect extraversion and neuroticism exerted on life satisfaction was partially mediated by self-esteem. Additionally, Rey, Pena, and Extremera (2011) found that mood clarity and emotional repair had a significantly indirect link (according to self-esteem) with life satisfaction in adolescents.

Self-esteem and life satisfaction are closely linked to perceived physical appearance, which is a particularly crucial source of self-esteem. For example, adolescents who perceive their bodies to be overweight are at risk of low self-esteem (Vohs, Bardone, Joiner, & Abramson, 1999). Tabak, Mazur, Oblacińska, and Jodkowska (2007) indicated that subjective body image was a predictor of life satisfaction and self-esteem. In addition, adolescent girls who are greatly concerned about being thin frequently have lower global self-esteem (Tiggemann, 2001), and women who feel dissatisfied with their bodies typically have lower life satisfaction (Cox, Zunker, Wingo, Thomas, & Ard, 2010). These findings indicate the intermixed associations between perceived physical appearance, self-esteem, and life satisfaction.

However, previous research has focused primarily on the pairwise links between physical appearance, self-esteem, and life satisfaction. The mediating mechanism (i.e., how perceived physical appearance relates to life satisfaction according to self-esteem) and moderating mechanism (i.e., the specific role life experience plays in people with disabilities) underlying the relationship between the three constructs remain largely undetermined. Comprehending the mediating and moderating mechanisms can facilitate a deeper insight into the mechanism of life satisfaction in deaf adolescents and the development of targeted intervention programs. In this study, we investigated whether a healthier perceived physical appearance results in higher self-esteem, improving life satisfaction experienced by deaf adolescents; and whether the indirect association between perceived physical appearance and life satisfaction is moderated by important individual characteristics such as life experience.

Hypotheses

We designed this study to test the following hypotheses:

Hypothesis 1. According to the strong links between perceived physical appearance, self-esteem, and life satisfaction suggested in previous studies, we posit that significant pairwise associations exist between perceived physical appearance, self-esteem, and global life satisfaction in deaf and hearing adolescents.

Hypothesis 2. According to findings indicating that self-esteem mediates the relationship between life satisfaction and its relevant factors, and that strong correlations exist between perceived physical appearance, self-esteem, and life satisfaction, we postulate that self-esteem mediates the relationship between perceived physical appearance and life satisfaction in deaf and hearing adolescents.

Hypothesis 3. According to empirical evidence that suggests active involvement in the deaf community is a strong factor enabling most deaf students to maintain positive self-esteem while interacting with hearing people (e.g., Burke et al., 2011; Jambor & Elliott, 2005), we hypothesize that a comparable indirect link exists between perceived physical appearance, self-esteem, and life satisfaction in deaf students at special education schools and hearing students; that is, the life experience of deaf adolescents in Chinese special education schools does not moderate this indirect link.

Methods

Participants

Hearing adolescent sample. The participants comprised 132 hearing sixth-, seventh-, and eighth-graders enrolled in an elementary and a middle school located in an inner-city neighborhood in Panyu, Guangzhou (Guangdong, China). Ages of the 71 boys and 61 girls ranged from 11 to 15 years with a mean age of 13.11 years (standard deviation [SD] = .85). The sample included 22 sixth-graders, 65 seventh-graders, and 45 eighth-graders. The students all spoke Mandarin, their mother tongue.

Deaf adolescent sample. The sample comprised 118 deaf sixth-, seventh-, and eighth-, and ninth-graders enrolled in five special education schools located in inner-city neighborhoods of five cities (Guangzhou, Zhongshan, Jiangmen, Taishan, and Dongguan; Guangdong, China). Ages of the 65 boys and 53 girls ranged from 11 to 19 years with a mean age of 15.12 (SD = 2.13). The sample included 39 sixth-graders, 24 seventh-graders, 27 eighth-graders, and 28 ninth-graders. All deaf students communicated with Chinese sign language and were deaf before the age of two.

Parental consent was obtained and only students with written consent forms participated in the study. The hearing and deaf participants were matched according to socioeconomic status and the intelligence level reported by school administrations. Participants (hearing and deaf) were children of hearing parents.

Procedures

Participants received a battery of questionnaires including the Physical Appearance and Attributes (PHY) subscale from the Piers-Harris Children's Self-Concept Scale (PHCSCS; Piers, 1969), the Rosenberg Self-Esteem Scale (RSE; Rosenberg, 1965), and the Multidimensional Students' Life Satisfaction Scale (MSLSS; Huebner, 1994). The Chinese versions of the PHCSCS (Su, Wang, & Yang, 1994), RSES (Ji & Yu, 1993), and MSLSS (Zhang, He, & Zheng, 2004) standardized for mainland Chinese participants were used, enabling participants to complete the questionnaires in Mandarin.

To ensure that the deaf participants were linguistically able to understand the written measures, two teachers fluent in sign language and experienced at teaching deaf adolescents Chinese, adapted the Chinese versions of the scales by minimizing difficult vocabulary. The participants completed the questionnaires individually, raising their hands for assistance from a language interpreter who could explain the questions in Chinese (for hearing participants) or Chinese sign language (for deaf participants) if there was a problem. The order of the questionnaires in the survey package was randomized among the participants.

Measures

Perceived physical appearance

The PHCSCS is a self-report questionnaire that includes statements expressing how children may feel about themselves. The PHY subscale comprises 13 true−false items measuring the child's appraisal of his or her physical appearance, and attributes such as leadership and the ability to express ideas. Examples from the PHY subscale include “My hair looks good,” and “I am good-looking.” In the present study, the Cronbach's alpha reliability coefficient was .80 for hearing adolescents and .71 for deaf adolescents.

Self-esteem

The RSES, which is used to measure global self-esteem by asking respondents to reflect on their current feelings, comprises 10 items pertaining to self-worth and self-acceptance; each item is rated on a 4-point scale ranging from 1 (*strongly agree*) to 4 (*strongly disagree*). Five item statements are positively worded, and five items statements are negatively worded. Examples from the RSES include, “I feel that I'm a person of worth, at least on an equal plane with others,” and “I am able to do things as well as most other people.” In the present study, the Cronbach's alpha reliability coefficient was .88 for hearing adolescents and .71 for deaf adolescents.

Life satisfaction

The MSLSS is a 40-item self-report scale that is used to assess the general or overall life satisfaction of children and provides a profile of satisfaction with critical, specific domains in their lives. Respondents rated the extent of their satisfaction regarding the five domains on a 6-point Likert scale ranging from 1 (*strongly disagree*) to 6 (*strongly agree*). The Chinese version comprised 36 items and 6 subscales (family, “I enjoy talking with my parents”; school, “I look forward to going to school”; friendship, “I have many friends”; study, “I am satisfied with my academic achievement”; freedom, “I can do what I love to do in my spare time”; environment, “I like where I live”). In the present study, the Cronbach's alpha reliability coefficients, computed by averaging items on each scale or subscale after reverse-scoring, for global life satisfaction, family, school, friendship, study, freedom, and environment were .94, .85, .92, .82, .82, .61, and .71, respectively, for hearing adolescents, and .90, .75, .82, .74, .74, .62, and .60, respectively, for deaf adolescents.

Results

Preliminary analyses

Table 1 presents the Pearson correlations of the variables in the hearing and deaf sample. In the hearing sample, significant correlations were observed between perceived physical appearance, self-esteem, and the six domains of life satisfaction (family, school, friendship, study, freedom, environment) ($ps < .05$); however, perceived physical appearance was not significantly related with family ($r = .12$; $p > .05$). In the deaf sample, significant correlations were determined between perceived physical appearance, self-esteem, and the six domains of life satisfaction ($ps < .05$); however, no significant correlations were observed between self-esteem and school ($r = .15$; $p > .05$) and freedom ($r = .15$; $p > .05$). Global life satisfaction was closely associated with perceived physical appearance and self-esteem in both deaf and hearing adolescents ($ps < .001$). Thus, Hypothesis 1 was supported.

Because of the high correlations between the six domains of life satisfaction observed in both samples, we further analyzed global life satisfaction instead of each specific domain of life satisfaction for simplicity and clarity. In addition, because age and sex were significantly related to the target variables in the hearing sample, we statistically controlled for these variables when performing hierarchical regression analyses.

Table 2 lists the means, standard deviations, and *t*-values among the variables. Self-esteem was lower in deaf adolescents than in hearing adolescents. However, perceived physical appearance was higher in deaf adolescents than in hearing adolescents. No significant difference in global life satisfaction was observed between the two samples.

Table 1
Correlation matrix of perception of physical appearance, self-esteem, and life satisfaction.

	Variables	1	2	3	4	5	6	7	8	9	10	11
Life satisfaction	1. Gender	–	.03	.00	.04	−.15	−.01	−.11	−.15	−.10	−.04	−.13
	2. Age	.04	–	.01	.01	.12	−.15	−.13	−.10	−.07	−.08	−.09
	3. PHY	.03	.23**	–	.34***	.31**	.21*	.32***	.37***	.23*	.26**	.39***
	4. Self-esteem	−.13	.23*	.54***	–	.27**	.15	.35***	.32***	.15	.18*	.33***
	5. Family	−.12	−.12	.12	.36***	–	.38***	.41***	.49***	.40***	.52***	.73***
	6. School	−.19*	−.09	.23**	.51***	.59***	–	.30**	.55***	.40***	.37***	.71***
	7. Friendship	−.21*	−.05	.39***	.49***	.39***	.55***	–	.61***	.45***	.44***	.74***
	8. Study	−.14	.06	.34***	.54***	.50***	.56***	.53***	–	.50***	.42***	.82***
	9. Freedom	−.03	−.04	.35***	.48***	.58***	.51***	.46***	.51***	–	.30**	.69***
	10. Environment	−.13	−.01	.21*	.44***	.68***	.62***	.53***	.48***	.57***	–	.67***
	11. Global life satisfaction	−.18*	−.06	.33***	.60***	.81***	.83***	.72***	.76***	.75***	.81***	–

Note. Correlations for deaf adolescents appear above the diagonal, $n = 118$; Correlations for normal hearing adolescents appear below the diagonal, $n = 132$.
$^{*}p < .05$; $^{**}p < .01$; $^{***}p < .001$.

Primary analyses

Mediation analyses

We conducted causal mediation analyses using the analytic models for mediation proposed by Baron and Kenny (1986); the analysis method was as follows: Three regression equations were tested. In Step 1, global life satisfaction was significantly regressed on perceived physical appearance. In Step 2, the hypothesized mediator (self-esteem) was significantly regressed on perceived physical appearance. In Step 3, global life satisfaction was significantly regressed on self-esteem after controlling for perceived physical appearance. For the models to exhibit a mediation effect, the aforementioned three requirements should be simultaneously fulfilled.

Table 3 summarizes the results of regression analyses performed to examine the mediation effect self-esteem exerted on the relationship between perceived physical appearance and life satisfaction. Perceived physical appearance significantly accounted for variations in global life satisfaction in Step 1 ($b = .86$; $p < .001$) and variations in self-esteem in Step 2 ($b = .83$; $p < .001$). In Step 3, self-esteem significantly predicted life satisfaction ($b = .37$; $p < .001$), and perceived physical appearance remained significantly associated with life satisfaction when self-esteem was included ($b = .55$; $p < .001$), indicating partial mediation. The results indicated that self-esteem partially mediated the relationship between perceived physical appearance and global life satisfaction; thus, Hypothesis 2 was supported.

Moderated mediation analyses

To further examine the extent to which life satisfaction may be explained by self-esteem and perceived physical appearance in the hearing and deaf samples and determine the moderated mediation effects, we performed regression analyses using self-esteem, perceived physical appearance, group (coding: 0 = hearing; 1 = deaf), and their two-way interactions. To increase the interpretability of the model parameters that include interaction terms, we centered all variables according to their means.

To test the moderated mediation hypothesis, we used the analytic models for determining moderated mediation proposed by Muller, Judd, and Yzerbyt (2005). Accordingly, three regression models were tested.

(1) Model 1: $Y = a_1 \cdot X + b_1 \cdot \mathrm{Mo} + c_1 \cdot \mathrm{X} \cdot \mathrm{Mo}$
(2) Model 2: $\mathrm{Me} = a_2 \cdot X + b_2 \cdot \mathrm{Mo} + c_2 \cdot \mathrm{X} \cdot \mathrm{Mo}$
(3) Model 3: $Y = a_3 \cdot X + b_3 \cdot \mathrm{Mo} + c_3 \cdot \mathrm{X} \cdot \mathrm{Mo} + d \cdot \mathrm{Me} + e \cdot \mathrm{Mo} \cdot \mathrm{Me}$

where X is the independent variable (perceived physical appearance); Mo is the moderator (group); Me is the mediator (self-esteem); and Y is the dependent variable (life satisfaction). To indicate moderated mediation, two conditions should be met: Firstly, in Model 1, a_1 should significantly differ from zero, and c_1 should not, which would indicate an overall treatment effect of perceived physical appearance. Secondly, in Models 2 and 3, one (or both) of the following patterns should be obtained: both c_2 and d should be significant (option 1), indicating the significant moderation group exerts on the path from perceived

Table 2
Mean scores and standard deviations of all variables of normal and deaf participants, and the values of their differences.

Group/variables	Normal adolescents	Deaf adolescents	*t*-values
PHY	.46 (.26)	.56 (.23)	−3.27**
Self-esteem	2.98 (.52)	2.67 (.50)	4.86***
Global life satisfaction	3.52 (.55)	3.52 (.60)	−.03

$^{**}p < .01$; $^{***}p < .001$.

Table 3
Regression results for the mediation model.

	Model 1		Model 2		Model 3	
	Life satisfaction		Self-esteem		Life satisfaction	
Predictor	*b*	*t*	*b*	*t*	*b*	*t*
CO: Gender	−.18	−2.67**	−.06	−.93	−.16	−2.49*
CO: Age	−.04	−2.06*	−.05	−2.70**	−.02	−1.18
X: PHY	.86	6.28***	.83	6.52***	.55	3.96***
Me: Self-esteem					.37	5.75***
R^2	.16		.16		.26	
F	15.78***		15.32***		21.64***	

Note. CO = control variables; *X* = independent variable; Me = mediator. $^{*}p < .05$; $^{**}p < .01$; $^{***}p < .001$.

physical appearance to self-esteem, or both a_2 and e should be significant (option 2), indicating the significant moderation effect group exerts on the path from self-esteem to life satisfaction.

Table 4 summarizes the statistical results of the regression models. In Model 1, we regressed life satisfaction on control variables, perceived physical appearance, group, and the interaction between perceived physical appearance and group. We observed an overall effect caused by perceived physical appearance on life satisfaction ($b = .75$; $p < .001$) that was not moderated by group ($b = .27$; $p > .05$). In Model 2, the hypothesized mediator, self-esteem, was regressed on control variables, perceived physical appearance, group, and the interaction between perceived physical appearance and group. As the model indicates, the main effect caused by perceived physical appearance was significant ($b = 1.08$; $p < .001$), but the interaction between perceived physical appearance and group was nonsignificant ($b = -.33$; $p > .05$). In Model 3, we regressed life satisfaction on control variables, perceived physical appearance, group, the interaction between perceived physical appearance and group, self-esteem, and the interaction between self-esteem and group. The effects self-esteem, group, and the interaction between perceived physical appearance and group exerted on life satisfaction were all significant ($ps < .05$). In addition, the effect self-esteem exerted on life satisfaction was significantly moderated by group ($b = -.34$; $p < .05$). A simple slope test indicated that for hearing adolescents, higher self-esteem was associated with higher life satisfaction ($b_{simple} = .61$; $p < .001$). However, for deaf adolescents, the effect self-esteem exerted on life satisfaction was weaker ($b_{simple} = .27$; $p < .01$).

Overall, the indirect effect perceived physical appearance exerted on life satisfaction through self-esteem was moderated by group (life experience). For hearing adolescents, perceived physical appearance increased the feeling of life satisfaction through increased self-esteem. By contrast, this indirect effect was smaller for deaf adolescents. Because group only affected the second stage of the mediation process, we designated this model the second stage moderation model, which is a type of moderated mediation model (Edwards & Lambert, 2007). Thus, Hypothesis 3 was unsupported.

Discussion

This study investigated the relationships between perceived physical appearance and life satisfaction, and the mediating effect exerted by self-esteem and the moderating effects exerted by life experience on these relationships among deaf and hearing adolescents. We primarily examined the effects perceived physical appearance and self-esteem exerted on life satisfaction. Overall, the results indicated that the relationship between perceived physical appearance and life satisfaction

Table 4
Regression results for the moderated mediation model.

	Model 1		Model 2		Model 3	
	Life satisfaction		Self-esteem		Life satisfaction	
Predictor	*b*	*t*	*b*	*t*	*b*	*t*
CO: Gender	−.18	−2.66**	−.06	−1.06	−.14	−2.16*
CO: Age	−.04	−1.63	.01	.71	−.04	−2.15*
X:PHY	.75	4.15***	1.08	6.87***	.09	.47
Mo: Group	.02	−.20	−.43	−6.21***	.18	2.21**
XMo: PHYGroup	.27	.95	−.33	−1.37	.73	2.52*
Me: Self-esteem					.61	6.22***
MoMe: Self-esteemGroup					−.34	−2.50*
R^2	.16		.28		.30	
F	9.61***		19.03***		14.85***	

Note. CO = control variables; *X* = independent variable; Mo = moderator; XMo = interaction between independent variable and moderator; Me = mediator; MoMe = interaction between mediator and moderator. $^{*}p < .05$; $^{**}p < .01$; $^{***}p < .001$.

was partially mediated by self-esteem in the deaf sample, but fully mediated by self-esteem in the hearing sample. In addition, the indirect link was moderated by life experience and was weaker for deaf adolescents than for hearing adolescents.

Deaf adolescents in Chinese special education schools

Although the results suggested that deaf students in special education schools had lower self-esteem than their hearing peers, the global life satisfaction of deaf students was comparable to that of their hearing peers, and the perceived physical appearance of deaf students exceeded that of their hearing peers. The results indicate that deaf adolescents in Chinese special education schools have adapted well to the special education environment. Various studies have shown that deaf people might have difficulty trusting their environment, exhibiting insecure attachment (Koester & Meadow-Orlans, 1990; Nienhuys & Tikotin, 1983); however, other studies have suggested that children educated in schools for the deaf who frequently interacted with deaf peers experienced fewer mental health problems than did deaf children educated in mainstream programs (Hindley, Hill, McGuigan, & Kitson, 1994; Hindley & Parkes, 1999). In addition, deaf people perceive themselves to be a close-knit and interconnected community and greatly enjoy being in the company of other deaf people, actively seeking out opportunities in which to interact (Rose, 1995). Thus, collectivism is apparently among the most dominant cultural patterns within the deaf culture. Chinese special education schools may partially enable transmitting deaf societal values and culture to deaf adolescents. And therefore deaf students benefit from the special education setting to an extent. For example, deaf people who attended special schools have more positive memories of their school days (Nunes, Pretzlik, & Olsson, 2001) than do those educated in public schools.

According to Crocker and Luhtanen (1990), the part of self-esteem derived from group membership is "collective self-esteem." Individuals from groups that have been traditionally discriminated against score higher on measures of collective self-esteem than do individuals from socially dominant groups (Bat-Chava, 1994; Crocker & Major, 1989; Ellemers, 1993). Because deaf people consider themselves to be members of a group that includes all deaf people (Rose, 1995), the self-esteem of deaf children in special education schools might be comparable with or even higher than that of their hearing peers. However, we determined that deaf children in special education schools reported lower self-esteem than did their hearing peers. Crocker and Luhtanen (1990) also asserted that membership in lower-status social groups damages self-esteem, implying that as a member of an inferior group, the individual is therefore inferior. Although the collective self-esteem of deaf adolescents may be higher than that of hearing adolescents, the self-esteem of deaf adolescents may be lower than that of hearing adolescents. The RSES measures primarily pertained to self-esteem, which may be the reason we observed lower self-esteem among deaf adolescents.

For the hearing adolescents, a culture that values appearance creates a critical context in which they develop attitudes about their physical appearance. Negative body images and attempts to lose weight to conform to societal standards of thinness are commonly linked to the attitudes and actions of peers (Dohnt & Tiggemann, 2006). In addition, hearing adolescents seem to focus more on the physical aspects of the body, such as weight, height, and skin. However, deaf adolescents value physical integrity more because of their hearing loss. In special education schools, differences between deaf adolescents and their deaf peers may be less apparent, and thus, deaf adolescents feel more satisfied with physical appearance. Therefore, the perceived physical appearance of deaf adolescents educated in special education schools is better than that of their hearing peers, a finding that is consistent with a recent finding indicating that deaf adolescents experienced higher levels of satisfaction with physical appearance than did hearing adolescents (van Gent, Goedhart, Knoors, Westenberg, & Treffers, 2012).

Moderated mediation of self-esteem on the link between perceived physical appearance and life satisfaction in deaf adolescents

The results of this study suggested that self-esteem mediated the relationship between perceived physical appearance and life satisfaction in deaf and hearing adolescents. Moreover, the results validated the moderating role life experience plays in the indirect link between perceived physical appearance and life satisfaction; the life experience of deaf adolescents attenuated the relationship between perceived physical appearance, self-esteem, and life satisfaction according to the link between self-esteem and life satisfaction. After a comprehensive literature review, we determined this study is among the first few to indicate the mediating effect of self-esteem and the moderating effect of life experience on the relationship between perceived physical appearance and life satisfaction.

Similar to the findings of previous studies suggesting that hearing loss causes lower self-esteem, social isolation, and distorted communication, affecting quality of life (e.g., Tambs, 2004), our findings indicate that hearing loss psychologically and negatively affects the interrelationship among social experiences, such as self-esteem and life satisfaction, particularly for deaf adolescents within a special education environment.

Unlike the perceived physical appearance of hearing adolescents, the perceived physical appearance of deaf adolescents directly affected life satisfaction, indicating that the role physical appearance plays in their psychological well-being is complicated; that is, in deaf adolescents, a more positive perceived physical appearance directly results in higher self-esteem and life satisfaction, suggesting that the perceived physical appearance of deaf adolescents influences numerous dimensions of life, including self-esteem and life satisfaction.

In addition, we observed that the path from self-esteem to life satisfaction was weaker in deaf adolescents than it was in hearing adolescents. As previously mentioned, experiencing discrimination can reduce self-esteem, because members of a group that is discriminated against (i.e., deaf adolescents) are presumed to internalize at least some of the negative societal devaluation of their group (e.g., Crocker & Major, 1989). This type of low self-esteem may be more apparent in Chinese culture, which emphasizes academic success in school (Wei, 2012), because deaf adolescents may compare their academic achievements with those of hearing peers. The weaker association between self-esteem and life satisfaction in deaf adolescents enrolled in special education schools suggests that experiencing discrimination may exacerbate lower self-esteem or feelings of self-worth in deaf adolescents; however, their life satisfaction is not notably affected.

This study contributes to relevant literature because the sample, deaf adolescents, had never been explored in literature related to perceived physical appearance, self-esteem, and life satisfaction. Although our findings suggest meaningful insights, the study had limitations that must be addressed in future research. First, because linguistic competency affects the performance of the three measures, future studies should directly measure the linguistic competency of participants, ensuring a similar degree of competency between deaf adolescents using sign language and hearing adolescents using communicating verbally. Second, the study was cross-sectional in nature, limiting the causal inferences that can be drawn. In addition, the reliability of the RSE and PHCSCS measures for deaf adolescents was consistently lower than that for their hearing peers. Future studies should use longitudinal designs to validate the causal assumptions that were made in this study, and assess retest reliability to ensure the validity of measures applied to the two samples. Third, using self-reports may have inflated the strength of the associations. Future studies should employ multiple informants and multiple methods to collect data. Fourth, because tests used to determine moderating effects in observational studies typically require a large sample size to provide adequate statistical power; we did not stratify the analyses by sex or other background variables. Previous research has shown that age and sex are related to body satisfaction (Umstattd, Wilcox, & Dowda, 2011). Thus, future studies should conduct such analysis to determine whether our results can be applied to different subgroups. Lastly, we tested the model using a sample of Chinese deaf adolescents enrolled in special education schools. Therefore, we cannot generalize our conclusions to dissimilar cultural settings and/or to a sample of deaf adolescents who are educated in mainstream schools.

These limitations not withstanding, our findings have practical implications. First, deaf adolescents educated in special education schools reported more positive perceived physical appearance and greater life satisfaction compared with their hearing peers. Because the type of school that is most suitable for satisfying the socioemotional needs of deaf student is being debated (Leigh, Maxwell-mccaw, Bat-chava, & Christiansen, 2009), this finding is critical. Second, our findings can enable practitioners to define pathways through which perceived physical appearance associates with life satisfaction in deaf adolescents, and thereby determine possible targeted interventions. For example, improving self-esteem may ameliorate the detrimental effects poor perceived physical appearance exerts on life satisfaction in deaf adolescents. Third, because the protective effect perceived physical appearance exerts on life satisfaction according to self-esteem is weaker for deaf adolescents than for hearing adolescents, and perceived physical appearance directly affects life satisfaction, we should develop and employ targeted interventions, such as increasing the perceived physical appearance of deaf students.

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